Model Exam 1

MATHEMATICS (Algebra and probability) **30 Marks**

Answer the following questions :

1 Choose the correct answer from those given :

1. One of the solutions for the two equations : $x - y = 2$, $x^2 + y^2 = 20$ in $\mathbb{R} \times \mathbb{R}$ is ....

   (a) $(-4 , 2)$ (b) $(2 , -4)$ (c) $(3 , 1)$ (d) $(4 , 2)$

2. If $A \cap B = \varnothing$, then $P(A - B) =$ ....

   (a) $P(A)$ (b) $P(B)$ (c) $P(B - A)$ (d) 1

3. If $x^2 + kx - 21 = (x - 3)(x + 7)$, then $k =$ ....

   (a) -2 (b) 4 (c) 8 (d) 20

4. If $\frac{1}{x} + \frac{1}{y} + \frac{1}{xy} = \frac{k}{xy}$, then $k =$ ....

   (a) 2 (b) 3 (c) $x + y + 1$ (d) $x + y$

5. If $5^{x-3} = 1$, then $2x^2 =$ ....

   (a) 36 (b) 9 (c) 18 (d) 3

6. If the width of the rectangle is 3 cm. , and its diagonal length is 5 cm. , then its length is .... cm.

   (a) 2 (b) $\frac{5}{3}$ (c) 4 (d) $\frac{3}{5}$

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2 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation : $x(x - 2) = 1$**

[b] If $n(x) = \frac{x^3 + x}{x^2 + 1} + \frac{x^2 + 2x + 4}{x^3 - 8}$, find $n(x)$ in the simplest form , showing the domain.

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3 [a] If the set of zeroes of the function $f : f(x) = \frac{x^2 - ax + 9}{bx + 4}$ is $\{3\}$ and its domain is $\mathbb{R} - \{2\}$

, find the value of each of a and b

[b] If $n(x) = \frac{x^3 - 8}{x^2 - 3x + 2} \div \frac{x^3 + 2x^2 + 4x}{2x^2 + x - 3}$, find $n(x)$ in the simplest form , showing the domain.

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4 [a] If $n_1(x) = \frac{x^2 + 5x + 6}{x^2 + x - 2}$ and $n_2(x) = \frac{x^2 - 2x - 15}{x^2 - 6x + 5}$, is $n_1 = n_2$? and why ?

[b] If A and B are two events of the sample space of a random experiment , and

$P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cup B) = \frac{5}{8}$ **, find each of the following :**

1. $P(A \cap B)$
2. $P(B - A)$
3. $P(A \cup B)'$

5 [a] **Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$x - y = 3$, $y^2 - x y = 21$

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations algebraically or graphically :** $y = x + 4$, $x + y = 4$

Answer the following questions :

1 Choose the correct answer from those given :

1. In the experiment of tossing a piece of coin once , if A is the event of appearance of a head , B is the event of appearance of a tail , then P (A ⋃ B) = ...
   (a) $\frac{1}{2}$ (b) 1 (c) zero (d) ∅
2. The number of solutions of the equation $x - y = 0$ in $\mathbb{R} \times \mathbb{R}$ is ....
   (a) 1 (b) 2 (c) 3 (d) infinite
3. The set of zeroes of $f : f(x) = \frac{-3}{x-2}$ is ....
   (a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{3\}$ (c) $\{2\}$ (d) ∅
4. If the curve of the quadratic function f passes through the points $(-1, 0)$, $(0, -4)$, $(4, 0)$, then the solution set of the equation $f(x) = 0$ in $\mathbb{R}$ is ....
   (a) $\{-1, 0\}$ (b) $\{-4, 0\}$ (c) $\{-1, 4\}$ (d) $\{4, -4\}$
5. If $2^{x+1} = 1$, then $x \in$ ....
   (a) $\{0\}$ (b) $\{0, 1\}$ (c) $\{-1\}$ (d) $\mathbb{R} - \{-1\}$
6. If $\sqrt{x^2} = 25$, then $x =$ ....
   (a) 5 (b) ± 5 (c) 25 (d) ± 25

2 [a] If A , B are two events in a random experiment and P (A) = 0.6 , P (B) = 0.5 , P (A ⋂ B) = 0.3 , **find :** P (A ⋃ B) , P (B̀)

[b] **Simplify to the simplest form , showing the domain :**

$$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$$

3 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$3x^2 - 6x = -1$ (approximating the result to the nearest two decimals)

[b] If the domain of the function n is $\mathbb{R} - \{3\}$ where $n(x) = \frac{x-1}{x^2 - ax + 9}$, find the value of a

4 [a] **Find the solution set of the following two equations together in $\mathbb{R} \times \mathbb{R}$:**

$y - x = 2$, $x^2 + xy - 4 = 0$

[b] **Find n (x) in the simplest form , showing the domain of n :**

$$n(x) = \frac{x-3}{x^2 - 7x + 12} - \frac{x-3}{3-x}$$

5 [a] Two acute angles in a right-angled triangle. The difference between their measures is 50°

Find the measure of each angle.

[b] If $n(X) = \dfrac{X^2 - 2X}{(X-2)(X^2+2)}$, **find :**

1 $n^{-1}(X)$ in the simplest form , showing the domain of n^{-1}

2 The value of X if $n^{-1}(X) = 3$

Model Exam 3

MATHEMATICS (Algebra and probability) **30 Marks**

Answer the following questions :

1 Choose the correct answer from those given :

1. If $n(X) = \dfrac{X^2 - 2X}{(X-2)(X^2+2)}$, then the domain of n^{-1} is ....
   (a) $\mathbb{R}$ (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{0\}$ (d) $\mathbb{R} - \{0 , 2\}$

2. If A and B are two mutually exclusive events from the sample space S of a random experiment , then $P(A - B) =$ ....
   (a) $P(B)$ (b) $P(A)$ (c) $P(\grave{A})$ (d) $P(\grave{B})$

3. In the equation : $a X^2 + b X + c = 0$, if : $b^2 - 4ac > 0$, then the equation has .... roots in $\mathbb{R}$
   (a) 1 (b) 2 (c) zero (d) ∞

4. The rule which describes the pattern $\left(\frac{1}{2} , \frac{2}{3} , \frac{3}{4} , \frac{4}{5} , ...\right)$ where $n \in \mathbb{Z}_+$ is ....
   (a) $\dfrac{2}{n+1}$ (b) $n + \dfrac{1}{2}$ (c) $\dfrac{n}{n+1}$ (d) $\dfrac{2n-1}{n+1}$

5. If $2^7 \times 3^7 = 6^k$, then $k =$ ....
   (a) 14 (b) 7 (c) 6 (d) 5

6. If $3^X = 4$, $4^y = 12$, then $\dfrac{X y}{X + 1} =$ ....
   (a) 2 (b) 1 (c) $\dfrac{1}{2}$ (d) $\dfrac{3}{4}$

2 [a] If A , B are two events from the sample space of a random experiment and

$P(A) = 0.7$, $P(B) = 0.5$ and $P(A \cap B) = 0.3$

, **find :** $P(\grave{A})$, $P(A - B)$ and $P(A \cup B)$

[b] If the set of zeroes of the function f where $f(X) = X^2 - 10X + a$ is $\{5\}$

, then find the value of a

3 [a] **Find the S.S. in $\mathbb{R}^2$ of the two equations :** $X + y = 2$, $\dfrac{1}{X} + \dfrac{1}{y} = 2$

[b] If $n_1(X) = \dfrac{X^2}{X^3 - X^2}$, $n_2(X) = \dfrac{X^3 + X^2 + X}{X^4 - X}$,

prove that : $n_1 = n_2$

4 [a] **Find n (X) in the simplest form and state the domain if :**

$n(X) = \dfrac{X^2 - 3X}{2X^2 - X - 6} \div \dfrac{2X^2 - 3X}{4X^2 - 9}$

[b] **Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$X + 2y = 8$, $3X + y = 9$

5 [a] **Using the general rule , find the solution set of the following equation in $\mathbb{R}$:**

$2X^2 - 5X + 1 = 0$

[b] **Find n (X) in the simplest form , showing the domain of n where :**

$$n(X) = \frac{X^2 + 2X}{X^2 - 4} - \frac{2X - 6}{X^2 - 5X + 6}$$

Answers of model 1

1

1 d 2 a 3 b

4 c 5 c 6 c

2

[a] $\because x(x-2)=1 \qquad \therefore x^2-2x-1=0$

$\therefore a=1, b=-2, c=-1$

$\therefore x=\frac{2\pm\sqrt{(-2)^2-4\times1\times(-1)}}{2\times1}$

$=\frac{2\pm\sqrt{8}}{2}=\frac{2\pm2\sqrt{2}}{2}=1\pm\sqrt{2}$

$\therefore x=1+\sqrt{2}$ or $x=1-\sqrt{2}$

$\therefore$ The S.S. $=\{1+\sqrt{2}, 1-\sqrt{2}\}$

[b] $\because n(x)=\frac{x(x^2+1)}{x^2+1}+\frac{x^2+2x+4}{(x-2)(x^2+2x+4)}$

$\therefore$ The domain of $n=\mathbb{R}-\{2\}$

$, n(x)=x+\frac{1}{x-2}=\frac{x(x-2)+1}{x-2}$

$=\frac{x^2-2x+1}{x-2}=\frac{(x-1)^2}{x-2}$

3

[a] $\because z(f)=\{3\} \qquad \therefore$ At $x=3$

$\therefore x^2-ax+9=0 \qquad \therefore 3^2-a\times3+9=0$

$\therefore 9-3a+9=0 \qquad \therefore -3a=-18 \qquad \therefore a=6$

$, \because$ The domain of $f=\mathbb{R}-\{2\}$

$\therefore$ At $x=2 \qquad \therefore bx+4=0$

$\therefore 2b+4=0 \qquad \therefore 2b=-4 \qquad \therefore b=-2$

[b] $\because n(x)=\frac{(x-2)(x^2+2x+4)}{(x-2)(x-1)}\div\frac{x(x^2+2x+4)}{(2x+3)(x-1)}$

$\therefore$ The domain of $n=\mathbb{R}-\{2, 1, 0, -\frac{3}{2}\}$

$, n(x)=\frac{x^2+2x+4}{x-1}\times\frac{(2x+3)(x-1)}{x(x^2+2x+4)}=\frac{2x+3}{x}$

4

[a] $\because n_1=\frac{(x+3)(x+2)}{(x+2)(x-1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_1=\mathbb{R}-\{-2, 1\}\\ , n_1(x)=\frac{x+3}{x-1}\end{array}\right\}$ (1)

$, \because n_2(x)=\frac{(x-5)(x+3)}{(x-5)(x-1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_2=\mathbb{R}-\{5, 1\}\\ , n_2(x)=\frac{x+3}{x-1}\end{array}\right\}$ (2)

From (1) and (2) : $\therefore n_1\neq n_2$

because the domain of $n_1\neq$ the domain of n_2

[b] 1 $\because P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$\therefore P(A\cap B)=P(A)+P(B)-P(A\cup B)$

$=\frac{1}{4}+\frac{1}{2}-\frac{5}{8}=\frac{1}{8}$

2 $P(B-A)=P(B)-P(A\cap B)=\frac{1}{2}-\frac{1}{8}=\frac{3}{8}$

3 $P(A\cup B)'=1-P(A\cup B)=1-\frac{5}{8}=\frac{3}{8}$

5

[a] $\because x-y=3 \qquad \therefore x=y+3 \qquad (1)$

$, y^2-xy=21 \qquad (2)$

substituting from (1) in (2) :

$\therefore y^2-(y+3)y=21 \qquad \therefore y^2-y^2-3y=21$

$\therefore -3y=21 \qquad \therefore y=-7$

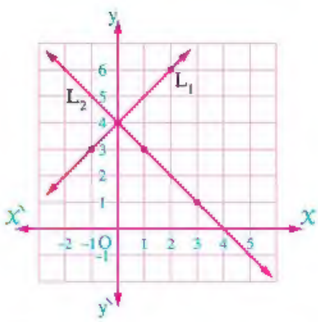
substituting in (1) : $\therefore x=-4$

$\therefore$ The S.S. $=\{(-4, -7)\}$

[b] $y=x+4 \quad , \quad x=4-y$

x	-1	0	2
y	3	4	6

x	3	1	0
y	1	3	4



From the graph : $\therefore$ The S.S. $=\{(0, 4)\}$

Answers of model 2

1

1 b 2 d 3 d

4 c 5 c 6 d

2

[a] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.6 + 0.5 - 0.3 = 0.8$

$\because P(\grave{B}) = 1 - P(B) \qquad \therefore P(\grave{B}) = 1 - 0.5 = 0.5$

[b] $\because n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)^2} \times \frac{2(x-1)}{x^2+x+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$, $n(x) = 2$

3

[a] $\because 3x^2 - 6x + 1 = 0$

$\therefore a = 3$, $b = -6$, $c = 1$

$\therefore x = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{6 \pm \sqrt{24}}{6}$

$= \frac{6 \pm 2\sqrt{6}}{6} = \frac{3 \pm \sqrt{6}}{3}$

$\therefore x \approx 1.82$ or $x \approx 0.18$

The S.S. $= \{1.82 , 0.18\}$

[b] $\because$ The domain of $n = \mathbb{R} - \{3\}$

$\therefore$ At $x = 3 \qquad \therefore x^2 - a x + 9 = 0$

$\therefore 9 - 3a + 9 = 0 \qquad \therefore -3a = -18 \qquad \therefore a = 6$

4

[a] $\because y - x = 2 \qquad \therefore y = x + 2 \qquad (1)$

$, x^2 + xy - 4 = 0 \qquad (2)$

Substituting from (1) in (2) :

$\therefore x^2 + x(x+2) - 4 = 0$

$\therefore x^2 + x^2 + 2x - 4 = 0$

$\therefore 2x^2 + 2x - 4 = 0$ (Dividing by 2)

$\therefore x^2 + x - 2 = 0$

$(x-1)(x+2) = 0$

$\therefore x = 1$ or $x = -2$

Substituting in (1) : $\therefore y = 3$ or $y = 0$

$\therefore$ The S.S. $= \{(1 , 3) , (-2 , 0)\}$

[b] $\because n(x) = \frac{x-3}{(x-4)(x-3)} + \frac{x-3}{x-3}$

$\therefore$ The domain of $n = \mathbb{R} - \{4 , 3\}$

$, n(x) = \frac{1}{x-4} + 1 = \frac{1 + x - 4}{x-4} = \frac{x-3}{x-4}$

5

[a] Let the measure of the first angle be $x°$

, the measure of the second angle be $y°$

$\therefore x + y = 90° \qquad (1)$

$, x - y = 50° \qquad (2)$

Adding (1) and (2) : $\therefore 2x = 140° \qquad \therefore x = 70°$

Substituting in (1) : $\therefore y = 20°$

$\therefore$ The measures of the two angles are $70°$, $20°$

[b] $\boxed{1}$ $\because n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0 , 2\}$

$, n^{-1}(x) = \frac{x^2+2}{x}$

$\boxed{2}$ $\because n^{-1}(x) = 3 \qquad \therefore \frac{x^2+2}{x} = 3$

$\therefore x^2 - 3x + 2 = 0 \qquad \therefore (x-2)(x-1) = 0$

$\therefore x = 2$ (refused) or $x = 1$

Answers of model 3

1

$\boxed{1}$ d	$\boxed{2}$ b	$\boxed{3}$ b
$\boxed{4}$ c	$\boxed{5}$ b	$\boxed{6}$ b

2

[a] $P(\grave{A}) = 1 - P(A) = 1 - 0.7 = 0.3$

$P(A - B) = P(A) - P(A \cap B)$

$= 0.7 - 0.3 = 0.4$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.7 + 0.5 - 0.3 = 0.9$

[b] $\because z(f) = \{5\} \qquad \therefore$ At $x = 5$

$\therefore x^2 - 10x + a = 0 \qquad \therefore (5)^2 - 10 \times 5 + a = 0$

$\therefore 25 - 50 + a = 0 \qquad \therefore a = 25$

3

[a] $\because x + y = 2 \qquad (1)$

$, \frac{1}{x} + \frac{1}{y} = 2 \qquad \therefore x + y = 2xy \qquad (2)$

Substituting in (1) from (2) : $\therefore 2 = 2\,x\,y$

$\therefore x\,y = 1$ $\qquad \therefore x = \frac{1}{y}$

Substituting in (1) : $\therefore \frac{1}{y} + y = 2$

Multiplying by y : $\therefore 1 + y^2 = 2\,y$

$\therefore y^2 - 2\,y + 1 = 0$ $\qquad \therefore (y-1)^2 = 0$

$\therefore y = 1$

Substituting in (1) : $\therefore x = 1$

$\therefore$ The S.S. $= \{(1 , 1)\}$

[b] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_1 = \mathbb{R} - \{0 , 1\} \\ \therefore n_1(x) = \frac{1}{x-1}\end{array}\right\}$ (1)

$, \because n_2(x) = \frac{x(x^2+x+1)}{x(x^3-1)}$

$= \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_2 = \mathbb{R} - \{0 , 1\} \\ , n_2(x) = \frac{1}{x-1}\end{array}\right\}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

4

[a] $\because n(x) = \frac{x(x-3)}{(2\,x+3)(x-2)} \div \frac{x(2\,x-3)}{(2\,x-3)(2\,x+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \left\{-\frac{3}{2} , 2 , 0 , \frac{3}{2}\right\}$

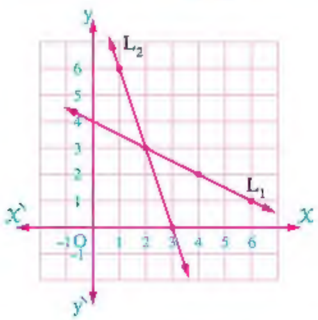
$, n(x) = \frac{x(x-3)}{(2\,x+3)(x-2)} \times \frac{(2\,x-3)(2\,x+3)}{x(2\,x-3)}$

$= \frac{x-3}{x-2}$

[b] $x = 8 - 2\,y$ $\qquad , y = 9 - 3\,x$

x	6	4	2
y	1	2	3

x	1	2	3
y	6	3	0



From the graph : $\therefore$ The S.S. $= \{(2 , 3)\}$

5

[a] $\because 2\,x^2 - 5\,x + 1 = 0$

$\therefore a = 2 , b = -5 , c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore$ The S.S. $= \left\{\frac{5+\sqrt{17}}{4} , \frac{5-\sqrt{17}}{4}\right\}$

[b] $\because n(x) = \frac{x(x+2)}{(x+2)(x-2)} - \frac{2(x-3)}{(x-2)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2 , 2 , 3\}$

$, n(x) = \frac{x}{x-2} - \frac{2}{x-2} = \frac{x-2}{x-2} = 1$

Model Examinations of the School Book on Algebra and Probability

Model 1

Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given :

1 The domain of the function n : n $(X) = \frac{X}{X-1}$ is ....

(a) $\mathbb{R} - \{0\}$ (b) $\mathbb{R} - \{1\}$ (c) $\mathbb{R} - \{0, 1\}$ (d) $\mathbb{R} - \{-1\}$

2 The number of solutions of the two equations : $X + y = 2$ and $y + X = 3$ together in $\mathbb{R} \times \mathbb{R}$ is ....

(a) zero (b) 1 (c) 2 (d) 3

3 If $X \neq 0$, then $\frac{5X}{X^2+1} \div \frac{X}{X^2+1} =$ ....

(a) -5 (b) -1 (c) 1 (d) 5

4 If the ratio between the perimeters of two squares is 1 : 2 , then the ratio between their areas is ....

(a) 1 : 2 (b) 2 : 1 (c) 1 : 4 (d) 4 : 1

5 The equation of the symmetric axis of the curve of the function f where $f(X) = X^2 - 4$ is ....

(a) $X = -4$ (b) $X = 0$ (c) $y = 0$ (d) $y = -4$

6 If $A \subset S$ of random experiment and $P(\grave{A}) = 2\,P(A)$, then $P(A) =$ ....

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1

2 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$2X^2 - 5X + 1 = 0$ "approximate the result to the nearest one decimal".

[b] **Find n (X) in the simplest form showing the domain where :**

$$n(X) = \frac{X-3}{X^2-7X+12} - \frac{4}{X^2-4X}$$

3 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$X - y = 0$ and $X^2 + Xy + y^2 = 27$

[b] **Find n (X) in the simplest form showing the domain where :**

$n(X) = \frac{X^2+4X+3}{X^3-27} \div \frac{X+3}{X^2+3X+9}$ then find n (2) , n (-3) if possible.

4 [a] A rectangle with a length more than its width by 4 cm. If the perimeter of the rectangle is 28 cm. , find the area of the rectangle.

[b] If $n(x) = \dfrac{x^2 - 2x}{x^2 - 3x + 2}$,

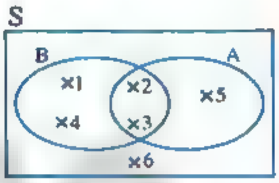
1 Find $n^{-1}(x)$ in the simplest form showing the domain of n^{-1}

2 If $n^{-1}(x) = 3$, then find the value of x

5 [a] If $n_1(x) = \dfrac{x^2}{x^3 - x^2}$ and $n_2(x) = \dfrac{x^3 + x^2 + x}{x^4 - x}$, **then prove that :** $n_1 = n_2$

[b] **In the opposite figure :**

If A and B are two events in a sample space S of a random experiment , **then find :**



1 $P(A \cap B)$

2 $P(A - B)$

3 The probability of non-occurrence of the event A

Model 2

Answer the following questions :

1 **Choose the correct answer :**

1 The solution set of the two equations : $x = 3$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(3 , 4)\}$ (b) $\{(4 , 3)\}$ (c) $\mathbb{R}$ (d) $\varnothing$

2 The set of zeroes of the function f where $f(x) = x^2 + 4$ in $\mathbb{R}$ is ....

(a) $\{2\}$ (b) $\{2 , -2\}$ (c) $\mathbb{R}$ (d) $\varnothing$

3 If A and B are two mutually exclusive events of a random experiment , then $P(A \cap B) =$ ....

(a) 0 (b) 1 (c) 0.5 (d) $\varnothing$

4 The domain of the multiplicative inverse of the function f : $f(x) = \dfrac{x + 2}{x - 3}$ is ....

(a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{-2 , 3\}$ (c) $\mathbb{R} - \{-3\}$ (d) $\mathbb{R}$

5 The two straight lines : $3x + 5y = 0$, $5x - 3y = 0$ are intersect in ....

(a) first quadrant. (b) second quadrant. (c) the origin point. (d) fourth quadrant.

6 If $P(A) = 0.6$, then $P(A') =$ ....

(a) 0.4 (b) 0.6 (c) 0.5 (d) 1

2 **[a] Find in $\mathbb{R}$ the solution set of the equation : $3x^2 - 5x + 1 = 0$**

by using the formula "approximate the result to the nearest two decimal places".

[b] Simplify :

$$n(x) = \frac{x^3 - 8}{x^2 + x - 6} \times \frac{x + 3}{x^2 + 2x + 4}$$, showing the domain of n.

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 1$, $x^2 + y^2 = 25$

[b] If A and B are two events of a random experiment and

$P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$

Find : 1 $P(A \cup B)$ 2 $P(A - B)$

4 **[a] Solve the following two equations in $\mathbb{R} \times \mathbb{R}$:** $2x - y = 3$, $x + 2y = 4$

[b] Simplify :

$$n(x) = \frac{x^2 + 3x}{x^2 - 9} \div \frac{2x}{x + 3}$$, showing the domain of n.

5 **[a] Simplify :**

$$n(x) = \frac{x^2 + 2x}{x^2 - 4} + \frac{x + 3}{x^2 - 5x + 6}$$, showing the domain of n.

[b] Graph the function f where $f(x) = x^2 - 1$, $x \in [-3, 3]$, from the graph find in $\mathbb{R}$ the solution set of the equation : $x^2 - 1 = 0$

Governorates' Examinations on Algebra and Probability

1 Cairo Governorate

Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given :

1 If the two equations $x + 3y = 6$, $2x + my = 12$ have an infinite number of solutions , then m = ...

(a) 1 (b) 2 (c) 3 (d) 6

2 If $2^{k-3} = 1$, then k = ...

(a) -3 (b) zero (c) 3 (d) 8

3 The set of zeroes of the function $f : f(x) =$ zero is ....

(a) $\mathbb{R} - \{0\}$ (b) $\varnothing$ (c) $\{0\}$ (d) $\mathbb{R}$

4 If $x^2 + ax - 4 = (x + 2)(x - 2)$, then a = ...

(a) -2 (b) zero (c) 2 (d) 4

5 If the two events A , B are mutually exclusive events from the sample space of a random experiment , then $P(A \cap B) =$ ....

(a) 1 (b) $\frac{1}{2}$ (c) $\varnothing$ (d) zero

6 If $|x| = 7$, then $x =$ ....

(a) 7 (b) -7 (c) ± 7 (d) 14

2 [a] Two real numbers their sum is 40 , and the difference between them is 10 , find the two numbers.

[b] **Find n (x) in the simplest form , showing the domain where :** $n(x) = \frac{x}{x-2} - \frac{2x+4}{x^2-4}$

3 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations together :**

$x - 3 = 0$, $x^2 + y^2 = 25$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^2 + x + 1}{x^3 - 1}$

, **prove that :** $n_1(x) = n_2(x)$ for all the values of x which belong to the common domain and find this domain.

4 [a] **Find n (x) in the simplest form , showing the domain where :**

$n(x) = \frac{x^3 - 8}{x^2 + x - 6} \times \frac{x + 3}{x^2 + 2x + 4}$

[b] Find algebraically in $\mathbb{R}$ the solution set of the equation : $2x^2 + 5x - 6 = 0$, approximating the results to the nearest one decimal place.

5 [a] If A , B are two events of the sample space of a random experiment and $P(A) = 0.7$, $P(B) = 0.5$, $P(A \cap B) = 0.3$

, **find :** 1 $P(A \cup B)$ 2 $P(A - B)$

[b] If $n(x) = \frac{x}{x+3}$

1 Find $n^{-1}(x)$, showing the domain of n^{-1} 2 If $n^{-1}(x) = 4$, find the value of x

2 Giza Governorate

Answer the following questions :

1 Choose the correct answer from the given ones :

1 If the perimeter of a square is 16 cm. , then its area = ... cm^2

(a) 4 (b) 8 (c) 16 (d) 64

2 The domain of the function $n : n(x) = \frac{x}{x^2 - 1}$ is ....

(a) $\{-1\}$ (b) $\mathbb{R} - \{1\}$ (c) $\{1 , -1\}$ (d) $\mathbb{R} - \{1 , -1\}$

3 If $\frac{1}{3}x = 2$, then $\frac{1}{2}x =$ ....

(a) 2 (b) 3 (c) 6 (d) 8

4 The number of solutions of the two equations $x + y = 1$, $x + y = 2$ together in $\mathbb{R} \times \mathbb{R}$ is ....

(a) zero (b) 1 (c) 2 (d) 3

5 If $x^2 + kx + 81$ is a perfect square , then k = ...

(a) ± 6 (b) ± 9 (c) ± 18 (d) ± 81

6 If $A \subset S$ of a random experiment , $P(A) + P(\acute{A}) = 2k$, then k = ...

(a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{3}$ (d) $\frac{1}{4}$

2 [a] **By using the formula find in $\mathbb{R}$ the solution set of the equation :** $2x^2 - 5x + 1 = 0$ rounding the results to two decimal places.

[b] **Find n (x) in its simplest form where :**

$n(x) = \frac{x^2 - 4}{x^3 - 8} \div \frac{x^2 - x - 6}{x^2 + 2x + 4}$, showing the domain.

3 **[a]** A right-angled triangle of hypotenuse length 10 cm. and its perimeter is 24 cm. Find the lengths of the other two sides.

[b] If A , B are two mutually exclusive events of a random experiment , P (A) = 0.2 , P (B) = 0.5 , **find :** P (A ∪ B) and P (A − B)

4 **[a]** If $n(x) = \frac{x^2 - 3x}{x^2 - 5x + 6}$

, **find :** 1 $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}

2 The value of x if $n^{-1}(x) = 2$

[b] Find the solution set for the following equations algebraically in ℝ × ℝ :

$x + 2y = 4$, $3x - y = 5$

5 **[a]** If $n(x) = \frac{x^2}{x-1} + \frac{x}{1-x}$, then find n (x) in the simplest form , showing the domain.

[b] If $n_1(x) = \frac{x^2 + x - 6}{x^2 - 4}$, $n_2(x) = \frac{x^2 - 9}{x^2 - x - 6}$, then show whether $n_1 = n_2$ or not and why.

3 Alexandria Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer from those given :**

1 The set of zeroes of the function f where $f(x) = x + 4$ in ℝ is ....

(a) {4 , −4} (b) {−4} (c) ℝ (d) ∅

2 If $x^3 y^{-3} = 8$, then $\frac{y}{x} =$

(a) $\frac{1}{512}$ (b) $\frac{1}{8}$ (c) 2 (d) $\frac{1}{2}$

3 The equation of the symmetric axis of the curve of the function f where $f(x) = x^2 - 4$ is

(a) $x = -4$ (b) x = zero (c) y = zero (d) y = −4

4 The solution set of the equation : $x^2 = 9$ in ℚ is ....

(a) {−3} (b) {3} (c) ∅ (d) {−3 , 3}

5 If A ⊂ S of a random experiment and P (Á) = 2 P (A) , then P (A) = ...

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1

6 $\frac{5^{x+2}}{5^{x+1}} =$ ....

(a) 5 (b) 10 (c) 15 (d) 20

2 [a] **Find the solution set of the two equations :**

$x - y = 0$ and $x^2 + x y + y^2 = 27$ in $\mathbb{R} \times \mathbb{R}$

[b] **Find the common domain for which $n_1(x)$ and $n_2(x)$ are equal , where :**

$n_1(x) = \dfrac{x^2 + x - 12}{x^2 + 5x + 4}$, $n_2(x) = \dfrac{x^2 - 2x - 3}{x^2 + 2x + 1}$

3 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$2x^2 + 5x = 0$

[b] **Find n (x) in the simplest form , showing the domain where :**

$n(x) = \dfrac{x^3 - 1}{x^2 - x} \times \dfrac{x + 3}{x^2 + x + 1}$

4 [a] **Find algebraically the solution set of the two equations :**

$2x + y = 1$, $x + 2y = 5$ in $\mathbb{R} \times \mathbb{R}$

[b] **Find n (x) in the simplest form , showing the domain where :**

$n(x) = \dfrac{x^2 - x}{x^2 - 1} + \dfrac{x + 5}{x^2 + 6x + 5}$

5 [a] If $n(x) = \dfrac{x^2 - 2x}{(x - 2)(x^2 + 2)}$

1 Find $n^{-1}(x)$ in the simplest form , showing the domain on n^{-1}

2 If $n^{-1}(x) = 3$, then find the value of x

[b] If A and B are two mutually exclusive events of a random experiment and

$P(A) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$, find : P (B)

4 El-Kalyoubia Governorate

Answer the following questions :

1 **Choose the correct answer :**

1 If $x^2 + kx - 21 = (x - 3)(x + 7)$, then k = ...

(a) – 2 (b) 4 (c) 8 (d) 20

2 One of the solutions for the two equations : $x - y = 2$, $x^2 + y^2 = 20$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) (– 4 , 2) (b) (2 , – 4) (c) (3 , 1) (d) (4 , 2)

3 If $5^{x-3} = 1$, then $2x^2 =$ ....

(a) 36 (b) 9 (c) 18 (d) 3

4 If $A \cap B = \varnothing$, then $P(A - B) =$ ....

(a) $P(A)$ (b) $P(B)$ (c) $P(B - A)$ (d) 1

5 If the width of the rectangle is 3 cm. , and its diagonal length is 5 cm. , then its length is .... cm.

(a) 2 (b) $\frac{5}{3}$ (c) 4 (d) $\frac{3}{5}$

6 If $\frac{1}{x} + \frac{1}{y} + \frac{1}{xy} = \frac{k}{xy}$, then $k =$ ....

(a) 2 (b) 3 (c) $x + y + 1$ (d) $x + y$

2 [a] If A and B are two events from the sample space of a random experiment and $P(A) = 0.8$, $P(B) = 0.7$, $P(A \cap B) = 0.6$
, find : 1 $P(A \cup B)$ 2 The probability of non-occurrence of the event A

[b] A rectangle with a length more than its width by 4 cm. If the perimeter of the rectangle is 28 cm. , find the area of the rectangle.

3 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 0$, $x^2 + xy + y^2 = 27$

[b] **Find n (x) in the simplest form , showing the domain :** $n(x) = \frac{x^2 + 2x}{x^3 - 27} \div \frac{x + 2}{x^2 + 3x + 9}$

4 [a] **Find in $\mathbb{R}$ the solution set of the equation :** $2x^2 - 4x + 1 = 0$ approximating the results to one decimal place. (using the general rule)

[b] If $n_1(x) = \frac{2x}{2x + 4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, **prove that :** $n_1 = n_2$

5 [a] **Find n (x) in the simplest form , showing the domain :**

$n(x) = \frac{x^2 + 2x + 4}{x^3 - 8} + \frac{x^2 - 9}{x^2 + x - 6}$

[b] If the domain of the function f where $f(x) = \frac{x}{x^2 - 5x + m}$ is $\mathbb{R} - \{2 , k\}$, then find the value of each of m and k

5 El-Sharkia Governorate

Answer the following questions : *(Calculators are allowed)*

1 **Choose the correct answer from the given ones :**

1 If the domain of the fractional function n (x) is $\mathbb{R} - \{2 , 3 , 4\}$, then n (3) = ...

(a) 3 (b) 2 (c) 4 (d) not exist

2 If $x^2 + y^2 = 5$, $xy = 2$ where $x \in \mathbb{R}$, $y \in \mathbb{R}$, then $(x + y)^2 =$ ....

(a) 7 (b) 9 (c) 5 (d) 13

3. The point (2 , – 1) does not belong to the straight line whose equation is ....

(a) $x + y = 1$ (b) $x - y = 3$ (c) $x = 2$ (d) $y = 5$

4. If $n(x) = \frac{x}{x-1}$, then the domain of n^{-1} is ....

(a) $\mathbb{R} - \{1, 0\}$ (b) $\mathbb{R} - \{0\}$ (c) $\mathbb{R} - \{1\}$ (d) $\{1, 0\}$

5. The two straight lines $L_1 : 3x + 7y = 0$ and $L_2 : 5x + 9y = 0$ are intersecting in the ....

(a) third quadrant. (b) fourth quadrant. (c) first quadrant. (d) origin point.

6. If A , B are two events from the sample space of a random experiment and $A \subset B$, which of the following expressions is false ?

(a) $P(A \cup B) = P(B)$ (b) $P(A \cap B) = P(A)$

(c) $P(A - B) = \text{zero}$ (d) $P(A - B) = P(B)$

2 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :** $x(x-2) = 1$

[b] If $n(x) = \frac{x^3 + x}{x^2 + 1} + \frac{x^2 + 2x + 4}{x^3 - 8}$, find $n(x)$ in the simplest form , showing the domain.

3 [a] **Find the solution set in $\mathbb{R} \times \mathbb{R}$ of the two equations :** $2x - y = 3$, $x + 2y = 4$

[b] If $n(x) = \frac{x^2 - 2x - 15}{x^2 - 9} \div \frac{10 - 2x}{x^2 - 6x + 9}$

, find $n(x)$ in the simplest form , showing the domain.

4 [a] **Find the solution set of the following two equations in $\mathbb{R} \times \mathbb{R}$:**

$x + 2y = 2$, $x^2 + 2xy = 2$

[b] If $n_1(x) = 1 - \frac{1}{x}$, $n_2(x) = \frac{1-x}{x}$, show whether $n_1 = n_2$ or not.

5 [a] In a random experiment , a regular dice is rolled once and observing the upper face.

If : **A :** The event of getting an even number.

B : The event of getting a prime number.

, find : $P(A)$, $P(B)$, $P(A \cup B)$

[b] If $n(x) = \frac{k}{x} + \frac{9}{x + m}$ where the domain of n is $\mathbb{R}$ $\{0, 4\}$, and $n(5) = 2$

, find the value of each of : m , k

6 El-Monofia Governorate

Answer the following questions : ***(Using calculator is permitted)***

1 Choose the correct answer from those given :

1 $4^{15} + 4^{15} = \dots\dots$

(a) 4^{30} (b) 4^{zero} (c) 8^{15} (d) 2^{31}

2 The necessary numbers to complete the pattern :

$\frac{1}{5}$, 0.4 , $\frac{3}{5}$, ... , ... , ... , $\frac{7}{5}$ is ....

(a) 0.8 , $\frac{6}{5}$, 1.2 (b) 0.8 , 1 , 1.2 (c) 0.6 , 0.8 , 1 (d) 0.8 , 1 , 4.1

3 The multiplicative inverse of the number $1 - \sqrt{2}$ is ....

(a) $1 + \sqrt{2}$ (b) $\sqrt{2} - 1$ (c) $-\left(1 + \sqrt{2}\right)$ (d) $\frac{1 + \sqrt{2}}{2}$

4 The domain of the function $n^{-1}(x) = \frac{x + 4}{x - 4}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{4\}$ (c) $\mathbb{R} - \{-4\}$ (d) $\mathbb{R} - \{4 , -4\}$

5 The two straight lines : $3x - 5y = 0$, $5x + 3y = 0$ intersect at the ....

(a) 1st quadrant. (b) 3rd quadrant. (c) origin point. (d) 4th quadrant.

6 If $P(A) = 3P(\acute{A})$, then $P(A) = \dots\dots$

(a) $\frac{3}{4}$ (b) 1 (c) $\frac{1}{3}$ (d) $\frac{1}{4}$

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$2x - y = 3$, $x + 2y = 4$

[b] **Find in $\mathbb{R}$ by using the general formula the solution set of the equation :**

$3x^2 = 5x - 1$ rounding the result to the nearest two decimal digits.

3 [a] If the set of zeroes of the function $f : f(x) = \frac{x^2 - ax + 9}{bx + 4}$ is $\{3\}$ and its domain is $\mathbb{R} - \{2\}$ **, find the value of each of a and b**

[b] If $n(x) = \frac{x^3 - 8}{x^2 - 3x + 2} \div \frac{x^3 + 2x^2 + 4x}{2x^2 + x - 3}$, find n (x) in the simplest form , showing the domain.

4 [a] If $n(x) = \frac{x - 3}{x^2 - 7x + 12} - \frac{4}{x^2 - 4x}$, find n (x) in the simplest form , showing the domain , then find n (4) if it is possible.

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x + y = 4$, $\frac{1}{x} + \frac{1}{y} = 1$, where $x \neq 0, y \neq 0$

5 [a] If $n_1(x) = \frac{x^2+5x+6}{x^2+x-2}$ and $n_2(x) = \frac{x^2-2x-15}{x^2-6x+5}$, is $n_1 = n_2$? and why ?

[b] If A and B are two events of the sample space of a random experiment , and $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cup B) = \frac{5}{8}$, **find each of the following :**

1 $P(A \cap B)$ 2 $P(B - A)$ 3 $P(A \cup B)'$

7 El-Gharbia Governorate

Answer the following questions :

1 Choose the correct answer :

1 If $2^{x+1} = 1$, then $x \in$ ....

(a) $\{0\}$ (b) $\{0, -1\}$ (c) $\{-1\}$ (d) $\mathbb{R} - \{-1\}$

2 The number of solutions of the equation $x - y = 0$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) 1 (b) 2 (c) 3 (d) infinite

3 In the experiment of tossing a piece of coin once , if A is the event of appearance of a head , B is the event of appearance of a tail , then $P(A \cup B) =$ ....

(a) $\frac{1}{2}$ (b) 1 (c) zero (d) $\varnothing$

4 The set of zeroes of $f : f(x) = \frac{-3}{x-2}$ is ....

(a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{3\}$ (c) $\{2\}$ (d) $\varnothing$

5 If the curve of the quadratic function f passes through the points $(-1, 0)$, $(0, -4)$, $(4, 0)$, then the solution set of the equation $f(x) = 0$ in $\mathbb{R}$ is ....

(a) $\{-1, 0\}$ (b) $\{-4, 0\}$ (c) $\{-1, 4\}$ (d) $\{4, -4\}$

6 If $\sqrt{x^2} = 25$, then $x =$ ....

(a) 5 (b) ± 5 (c) 25 (d) ± 25

2 [a] If A and B are two events in the sample space of a random experiment and $P(A) = 0.5$, $P(A \cup B) = 0.8$, $P(B) = x$, $P(A \cap B) = 0.1$

Find the value of : x and $P(A - B)$

[b] If $n(x) = x + \frac{x}{x-2}$, find $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}

3 [a] **Find $n(x)$ in the simplest form , showing the domain of n where :**

$n(x) = \frac{x}{x-2} - \frac{x}{x+2}$

[b] **Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$x - y = 3$, $y^2 - xy = 21$

4 [a] **By using the general rule and without using the calculator , find in $\mathbb{R}$ the solution set of the equation :** $x^2 + 2x - 4 = 0$ in the simplest form.

[b] If $n_1(x) = \frac{x^2 - 4}{x^2 + x - 6}$, $n_2(x) = \frac{x^2 - x - 6}{x^2 - 9}$, is $n_1 = n_2$? With the reason.

5 [a] **Find n (x) in the simplest form , showing the domain of n where :**

$n(x) = \frac{x^3 - 1}{x^2 - x} \div \frac{x^2 + x + 1}{x + 3}$

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations algebraically or graphically :** $y = x + 4$, $x + y = 4$

8 El-Dakahlia Governorate

Answer the following questions : ***(Calculator is permitted)***

1 [a] **Choose the correct answer from the given ones :**

1. The solution set of the two equations $x - 3 = 0$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is ....
   (a) $\{3 , 4\}$ (b) $\{(3 , 4)\}$ (c) $\{(4 , 3)\}$ (d) $\varnothing$
2. If A , B are two events in a random experiment , $A \subset B$, then $P(A \cup B) =$ ....
   (a) P (B) (b) P (A) (c) $P(A \cap B)$ (d) 0
3. If $3^y \times 5^y = 225$, then y = ...
   (a) 2 (b) 15 (c) 0 (d) 20

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the equations :** $3x - y = 5$ and $x + 2y = 4$

2 [a] **Choose the correct answer from the given ones :**

1. The domain of the additive inverse of the function n : $n(x) = \frac{x + 2}{x - 3}$ is ....
   (a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{-2\}$ (c) $\mathbb{R} - \{-2 , 3\}$ (d) $\mathbb{R}$
2. The set of zeroes of the function $f : f(x) = x^2 + 9$ in $\mathbb{R}$ is ....
   (a) $\mathbb{R}$ (b) $\{3\}$ (c) $\{3 , -3\}$ (d) $\varnothing$
3. The curve $y = a x^2 + b x + c$ cuts y-axis at the point ....
   (a) (0 , b) (b) (b , 0) (c) (c , 0) (d) (0 , c)

[b] **Find n (x) in the simplest form , showing the domain :** $n(x) = \frac{x^2 + x}{x^2 - 1} - \frac{5 - x}{x^2 - 6x + 5}$

3 [a] If A , B are two events in a random experiment and $P(A) = 0.6$, $P(B) = 0.5$, $P(A \cap B) = 0.3$, find : $P(A \cup B)$, $P(\bar{B})$

[b] Simplify to the simplest form , showing the domain :

$$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$$

4 [a] If $n_1(x) = \frac{x^2 - x}{x^3 - 2x^2}$, $n_2(x) = \frac{x^2 - 3x + 2}{x^3 - 4x^2 + 4x}$, **prove that :** $n_1 = n_2$

[b] **By using the general rule , find the solution set of the equation :**
$2x^2 - 4x + 1 = 0$ in $\mathbb{R}$, rounding the results to two decimal places.

5 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 0$ and $x = \frac{4}{y}$ algebraically.

[b] If $n(x) = \frac{x^2 - 2x}{(x-2)(x^2+2)}$

1. Find : $n^{-1}(x)$ and identify the domain of n^{-1}
2. If $n^{-1}(x) = 3$, what is the value of x ?

9 Ismailia Governorate

Answer the following questions : (Calculators are allowed)

1 Choose the correct answer from those given :

1. If x is the additive identity element , y is the multiplicative identity element , then $2^x + 3^y = \ldots\ldots\ldots$
   (a) 2 (b) 3 (c) 4 (d) 5
2. The set of zeroes of the function $f : f(x) = 2x - 6$ is $\ldots\ldots\ldots$
   (a) $\{1\}$ (b) $\{3\}$ (c) $\{5\}$ (d) $\{7\}$
3. If $\sqrt{x} = 2$, then $\frac{1}{2} x = \ldots\ldots\ldots$
   (a) 8 (b) 6 (c) 4 (d) 2
4. The number of solutions of the two equations : $2x - y = 3$, $x + 2y = 4$ in $\mathbb{R} \times \mathbb{R}$ is $\ldots\ldots\ldots$
   (a) 1 (b) zero (c) 2 (d) infinite.
5. If A , B are two mutually exclusive events of a random experiment , then $P(A \cap B) = \ldots\ldots\ldots$
   (a) $\varnothing$ (b) 1 (c) zero (d) 0.5
6. If $x - y = 3$ and $x + y = 5$, then $x^2 - y^2 + 2 = \ldots\ldots\ldots$
   (a) 15 (b) 16 (c) 17 (d) 18

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations together :**
$2x + y = 1$, $x + 2y = 5$

[b] If $n_1(x) = \frac{x^2 - 3x + 9}{x^3 + 27}$, $n_2(x) = \frac{2}{2x + 6}$, **prove that :** $n_1 = n_2$

3 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**
$3x^2 - 6x = -1$ (approximating the result to the nearest two decimals)

[b] If the domain of the function n is $\mathbb{R} - \{3\}$ where $n(x) = \frac{x-1}{x^2 - ax + 9}$, find the value of a

4 [a] Two numbers , their product is 10 and the difference between them is 3
Find the two numbers.

[b] **Find n (x) in the simplest form , showing the domain of n where :**
$n(x) = \frac{x^2 + 4x - 5}{x^3 - 8} \div \frac{x + 5}{x^2 + 2x + 4}$ **, then find :** n (3) , n (2) if it is possible.

5 [a] **Find n (x) in the simplest form , showing the domain of n where :**
$n(x) = \frac{x^2 - 3x}{x^2 - 9} + \frac{x - 1}{x^2 + 2x - 3}$

[b] If A and B are two events in the sample space of a random experiment and
$P(A) = 0.4$, $P(B) = 0.5$ and $P(A \cap B) = 0.2$
, find : [1] $P(A \cup B)$ [2] $P(A - B)$

10 Suez Governorate

Answer the following questions : (Calculators are allowed)

1 **Choose the correct answer from the given ones :**

[1] The set of zeroes of f where $f(x) = x - 5$ is ....
(a) $\mathbb{R}$ (b) $\{-5\}$ (c) $\{5\}$ (d) $\varnothing$

[2] If $A \subset S$ of a random experiment , $P(\acute{A}) = P(A)$, then $P(A) =$ ....
(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1

[3] The solution set in $\mathbb{R} \times \mathbb{R}$ of the two equations : $x = 3$, $y = 4$ is ....
(a) $\{(3 , 4)\}$ (b) $\{(4 , 3)\}$ (c) $\mathbb{R}$ (d) $\varnothing$

[4] If the ratio between the perimeters of two squares is 1 : 2 , then the ratio between their areas is ....
(a) 1 : 2 (b) 2 : 1 (c) 1 : 4 (d) 4 : 1

[5] If $n(x) = \frac{x-1}{x+1}$, then the domain of $n^{-1} =$ ....
(a) $\{-1\}$ (b) $\mathbb{R} - \{-1 , 1\}$ (c) $\mathbb{R} - \{-1\}$ (d) $\mathbb{R}$

[6] If $a - b = -3$, then $(a - b)^2 =$ ....
(a) -9 (b) 12 (c) 9 (d) 18

2 [a] **Find the solution set in $\mathbb{R} \times \mathbb{R}$ of the equations :** $x - y = 3$, $2x + y = 9$

(Explain your answer , showing the steps of the solution)

[b] **Find n (x) in the simplest form , showing the domain of n where :**

$$n(x) = \frac{x^2 - 2x}{x^2 - 4} + \frac{2x + 6}{x^2 + 5x + 6}$$

3 [a] **Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :** $x - y = 0$, $xy = 9$

[b] **Find n (x) in the simplest form , showing the domain of n where :**

$$n(x) = \frac{x^2 + 2x - 3}{x + 3} \times \frac{x + 1}{x^2 - 1}$$

4 [a] A and B are two events from the sample space of a random experiment and

$P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$

Find : 1 $P(A \cup B)$ 2 $P(\acute{A})$

[b] **Find n (x) in the simplest form , showing the domain of n where :**

$$n(x) = \frac{x^2 - 2x + 1}{x^3 - 1} \div \frac{x - 1}{x^2 + x + 1}$$

5 [a] **Find the solution set for the following equation by using the formula in $\mathbb{R}$:**

$x^2 - 2x - 6 = 0$ (Rounding the results to two decimal places)

[b] If $n_1(x) = \frac{2x}{2x + 4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, **prove that :** $n_1 = n_2$

11 Port Said Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 Which of the following graphs represents two equations of the first degree in two variables which have no common solution ?

(a) (b) (c) (d)

2 The set of zeroes of the function $f : f(x) = x^2 + x + 1$ is ....

(a) $\{1\}$ (b) $\{-1\}$ (c) $\varnothing$ (d) $\{-1 , 1\}$

3 If the ratio between the perimeters of two squares is 3 : 4 ,
then the ratio between their areas is ……………

(a) 3 : 4 (b) 9 : 16 (c) 16 : 9 (d) 4 : 3

4 If $A \subset S$ of a random experiment , $P(\acute{A}) = 2\,P(A)$, then $P(A) =$ ………

(a) 1 (b) $\frac{2}{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{3}$

5 If $n(x) = \frac{x-2}{x+5}$, then the domain of the function n^{-1} is ……………

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{5\}$ (d) $\mathbb{R} - \{2 , -5\}$

6 If a fair die is rolled once , then the probability of getting an even number and a prime number together equals ……………

(a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) zero (d) 1

2 [a] If the domain of the function $n : n(x) = \frac{x-1}{x^2 - a\,x + 9}$ is $\mathbb{R} - \{3\}$,
then find the value of a

[b] A rectangle is of perimeter 22 cm. and area 24 cm². Find its two dimensions.

3 [a] **Find in $\mathbb{R}$ by using the general formula the solution set of the equation :** $x^2 - 2x - 1 = 0$
approximating the results to the nearest one decimal digit.

[b] **Find n (x) in the simplest form , showing the domain where :**
$n(x) = \frac{x^2 + x + 1}{x} \div \frac{x^3 - 1}{x^2 - x}$

4 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x + 3y = 7$, $5x - y = 3$

[b] **Find n (x) in the simplest form , showing the domain where :**
$n(x) = \frac{x^2 + 2x}{x^2 - 4} + \frac{x - 3}{x^2 - 5x + 6}$

5 [a] A set of cards numbered from 1 to 20 and well mixed. If a card is drawn randomly
, **find the probability that the drawn card is carrying :**

1 A number multiple of 4
2 A number multiple of 5
3 A number multiple of 4 or 5

[b] If $n_1(x) = \frac{x+3}{x^2 - 9}$, $n_2(x) = \frac{2}{2x - 6}$
, **prove that :** $n_1(x) = n_2(x)$ for the value of x which belong to the common domain and find the domain.

12 Damietta Governorate

Answer the following questions : (Calculators are allowed)

1 Choose the correct answer from the given ones :

[1] If there are an infinite number of solutions of the two equations : $x + 4y = 7$, $x + (k - 1)y = 7$ in $\mathbb{R} \times \mathbb{R}$, then k = ...

(a) 5 (b) 7 (c) 12 (d) 13

[2] If $B \subset A$, then $P(A \cup B) =$ ....

(a) 1 (b) P (A) (c) P (B) (d) 2 P (B)

[3] If $x = 2$, $y = 3$, then $(y - 2x)^{10} =$ ....

(a) – 1 (b) zero (c) 5 (d) 1

[4] If $ab = 3$, $ab^2 = 12$, then b = ...

(a) 4 (b) 2 (c) – 2 (d) ± 2

[5] If 3 is one of zeroes of the function f where $f(x) = x^2 - 3x + c$, then c = ...

(a) 6 (b) 0 (c) – 6 (d) 3

[6] If a , b , c are three rational numbers where a < b and c is a negative number , then ac .... bc

(a) > (b) = (c) ≤ (d) <

2 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :** $x + \frac{4}{x} = 6$, rounding the results to one decimal digit.

[b] **Simplify :** $n(x) = \frac{2x}{x - 3} \div \frac{x^2 + 2x}{x^2 - 9}$, showing the domain.

3 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations graphically :**
$x + 2y = 4$, $2x - y = 3$

[b] **Simplify :** $n(x) = \frac{x^2 - 2x + 4}{x^3 + 8} + \frac{x^2 - 1}{x^2 + x - 2}$, showing the domain.

4 [a] If $n_1(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, $n_2(x) = \frac{2x}{2x + 4}$,
then prove that : $n_1 = n_2$

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 2$, $x^2 + y^2 = 20$

5 [a] If the domain of the function n : $n(x) = \frac{x + 1}{x^2 - a x + 25}$ is $\mathbb{R} - \{5\}$,
then find the value of a

[b] If A and B are two events from the sample space of a random experiment ,

$P(A) = 0.8$, $P(B) = 0.7$, $P(A \cap B) = 0.6$

, find : 1 $P(A \cup B)$ 2 The probability of non-occurrence of the event A

13 Kafr El-Sheikh Governorate

Answer the following questions : *(Calculator is allowed)*

1 [a] **Choose the correct answer :**

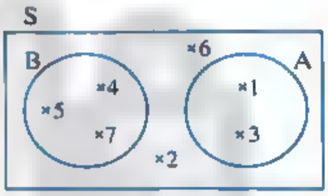
1 If there is only one solution for the two equations $x + 4y = 5$ and $3x + ky = 15$, then k can't equal ....

(a) -4 (b) 4 (c) 12 (d) -12

2 If $\sqrt{100-36} = 10 - a$, then $a =$ ....

(a) 2 (b) 6 (c) 4 (d) 3

3 **In the opposite figure :**



If A and B are two events in the sample space S of a random experiment ,

then $P(B - A) =$ ....

(a) $\frac{1}{2}$ (b) $\frac{5}{7}$ (c) $\frac{2}{7}$ (d) $\frac{3}{7}$

[b] **Find n (x) in the simplest form , showing the domain of n where :**

$$n(x) = \frac{2x^2 - x - 6}{x^2 - 3x} \div \frac{4x^2 - 9}{2x^2 - 3x}$$

2 [a] **Choose the correct answer :**

1 If the domain of the function n : $n(x) = \frac{x + 2}{4x^2 + kx + 9}$ is $\mathbb{R} - \left\{\frac{-3}{2}\right\}$, then the value of $k =$ ....

(a) 15 (b) -15 (c) 12 (d) -12

2 If $6^x = 12$, then $6^{x+1} =$ ....

(a) 66 (b) 13 (c) 27 (d) 72

3 The S.S. of the inequality : $-x < 3$ in $\mathbb{R}$ is ....

(a) $[3 , \infty[$ (b) $]3 , \infty[$ (c) $]-3 , \infty[$ (d) $[-3 , \infty[$

[b] If $n_1(x) = \frac{x}{x^2 - x}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, **prove that :** $n_1 = n_2$

3 [a] **Find in $\mathbb{R}$ the solution set of the equation :** $3x^2 + 1 = 5x$, rounding the results to two decimal places.

[b] If $n_1(x) = \frac{x^2 - 2x - 15}{x^2 - 9}$, $n_2(x) = \frac{6 - a x}{x^2 - 6x + 9}$, where the set of zeroes of n_2 is $\{-3\}$

1. Find the value of a
2. Find n (x) where $n(x) = n_1(x) - n_2(x)$ in the simplest form, showing the domain of n

4 [a] **Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$3x + 2y = 4$, $x - 3y = 5$

[b] If A and B are two events from the sample space S of a random experiment , $P(A) = \frac{1}{2}$, $2P(B) = P(\acute{B})$, **then find $P(A \cup B)$ in each of the following cases :**

1. $P(A \cap B) = \frac{1}{6}$
2. A , B are mutually exclusive events.

5 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$x - 2y - 1 = 0$, $x^2 - xy = 0$

[b] If $n(x) = \frac{x^2 - 3x}{(x-3)(x^2+2)}$, **then find :** $n^{-1}(x)$ and identify the domain of n^{-1}

14 El-Beheira Governorate

Answer the following questions : (Calculator is permitted)

1 Choose the correct answer from the given ones :

1. If $x^2 - y^2 = 12$, $x - y = 3$, then $x + y =$ ....
   (a) 3 (b) 4 (c) 12 (d) 15
2. If $3a = \sqrt{4}\, b$, then $\frac{a}{b} =$ ....
   (a) $\frac{2}{3}$ (b) $\frac{3}{2}$ (c) $\frac{3}{4}$ (d) $\frac{4}{3}$
3. If $5x = 5^3$, then $\frac{4}{5}x =$ ....
   (a) 10 (b) 15 (c) 20 (d) 25
4. The number of solution of the two equations $x + y = 1$ and $y + x = 2$ together in $\mathbb{R} \times \mathbb{R}$ is ....
   (a) zero (b) 1 (c) 2 (d) 3
5. The common domain of the functions n_1 , n_2 where $n_1(x) = \frac{x+2}{x^2-4}$, $n_2(x) = \frac{1}{x+1}$ is ....
   (a) $\{-2, -1, 2\}$ (b) $\mathbb{R} - \{-1, 2\}$
   (c) $\mathbb{R} - \{-2, -1, 2\}$ (d) $\mathbb{R}$
6. If $A \subset B$, then $P(A \cup B) =$ ....
   (a) zero (b) P (A) (c) P (B) (d) $P(A \cap B)$

2 [a] **Find the solution set of the following two equations together in $\mathbb{R} \times \mathbb{R}$:**

$y - x = 2$, $x^2 + x y - 4 = 0$

[b] **Find n (x) in the simplest form , showing the domain of n where :**

$$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$$

3 [a] Two acute angles in a right-angled triangle. The difference between their measures is 50°

Find the measure of each angle.

[b] If $n(x) = \dfrac{x^2 - 2x}{(x-2)(x^2+2)}$, **find :**

1 $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}

2 The value of x if $n^{-1}(x) = 3$

4 [a] **By using the general formula , find the solution set of the following equation in $\mathbb{R}$:**

$3x^2 = 5x - 1$ (rounding the results to two decimal places).

[b] If $n_1(x) = \dfrac{2x}{2x+4}$, $n_2(x) = \dfrac{x^2 + 2x}{x^2 + 4x + 4}$, **then prove that :** $n_1 = n_2$

5 [a] **Find n (x) in the simplest form , showing the domain where :**

$$n(x) = \frac{x - 3}{x^2 - 7x + 12} - \frac{4}{x^2 - 4x}$$

[b] If A and B are two events from the sample space of a random experiment and

$P(A) = 0.8$, $P(B) = 0.7$, $P(A \cap B) = 0.6$

, then find : 1 $P(A')$ 2 $P(A \cup B)$

15 El-Fayoum Governorate

Answer the following questions : (Using calculators is allowed)

1 Choose the correct answer :

1 In the equation : $a x^2 + b x + c = 0$, if : $b^2 - 4ac > 0$, then the equation has .... roots in $\mathbb{R}$

(a) 1 (b) 2 (c) zero (d) ∞

2 If $3^x = 4$, $4^y = 12$, then $\dfrac{x y}{x + 1} =$ ....

(a) 2 (b) 1 (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

3 If $n(x) = \dfrac{x^2 - 2x}{(x-2)(x^2+2)}$, then the domain of n^{-1} is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{0\}$ (d) $\mathbb{R} - \{0 , 2\}$

4 If $2^7 \times 3^7 = 6^k$, then k = ...

(a) 14 (b) 7 (c) 6 (d) 5

5 If A and B are two mutually exclusive events from the sample space S of a random experiment , then P (A – B) = ...

(a) P (A) (b) P (Á) (c) P (B) (d) P (B́)

6 The rule which describes the pattern $\left(\frac{1}{2} , \frac{2}{3} , \frac{3}{4} , \frac{4}{5} , ...\right)$ where $n \in \mathbb{Z}_+$ is ....

(a) $\frac{2}{n+1}$ (b) $n + \frac{1}{2}$ (c) $\frac{n}{n+1}$ (d) $\frac{2n-1}{n+1}$

2 [a] **Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following pair of equations :**

$3x - y + 4 = 0$, $y = 2x + 3$

[b] Reduce $n(x) = \frac{x^2 - x}{x^2 - 1} + \frac{x - 5}{x^2 - 6x + 5}$ to the simplest form , showing the domain of n

3 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$x^2 + 3x + 5 = 0$

[b] If $n(x) = \frac{x^2 - 49}{x^3 - 8} \div \frac{x + 7}{x - 2}$, find the simplest form of n (x) , showing the domain , then find n (1)

4 [a] If $n_1(x) = \frac{x^2 - 4}{x^2 + x - 6}$, $n_2(x) = \frac{x^3 - x^2 - 6x}{x^3 - 9x}$, show whether $n_1 = n_2$ or not. (give a reason)

[b] The sum of two real numbers is 9 , and the difference between their squares equals 45 , find the two numbers.

5 [a] If the set of zeroes of the function $f : f(x) = a x^2 + b x + 15$ is $\{3 , 5\}$, find the values of a and b

[b] If A and B are two events of the sample space of a random experiment , $P(A) = P(\acute{A})$, $P(A \cap B) = \frac{1}{16}$, $P(B) = \frac{5}{8} P(A)$

, find : 1 P (B) 2 $P(A \cup B)$

16 Beni Suef Governorate

Answer the following questions : *(Calculator is allowed)*

1 **Choose the correct answer from those given :**

1 If a coin is tossed once , then the probability of appearing a tail equals ....

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) 1

2 The set of zeroes of the function f where $f(x) = \frac{x-3}{x-2}$ is ....

(a) {zero} (b) {2} (c) {3} (d) {2 , 3}

3 The equation $3x + 4y + x^2 y = 5$ is of the .... degree.

(a) zero (b) first (c) second (d) third

4 The domain of the function f where $f(x) = \frac{x-3}{2}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{-2\}$ (c) $\mathbb{R} - \{3\}$ (d) $\mathbb{R} - \{-2, 3\}$

5 If $x + y = xy = 10$, then $x^2 y + x y^2 =$ ....

(a) 10 (b) 20 (c) 30 (d) 100

6 The solution set of the two equations : $y = 4$, $x + y = 7$ together in $\mathbb{R} \times \mathbb{R}$ is ....

(a) (3 , 4) (b) (4 , 3) (c) {(3 , 4)} (d) {(4 , 3)}

2 **[a] Find in $\mathbb{R}$ by using the general formula , the solution set of the equation :**

$x^2 - 2(x + 1) = 0$

[b] If $n_1(x) = \frac{5x}{5x + 25}$, $n_2(x) = \frac{x^2 + 5x}{x^2 + 10x + 25}$ **, then prove that :** $n_1 = n_2$

3 **[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$x + y = 7$, $x^2 + y^2 = 25$

[b] Find n (x) in its simplest form , showing the domain where :

$n(x) = \frac{x^2}{x^2 - 3x} \div \frac{3x}{x^2 - 9}$

4 [a] If A , B are two events from the sample space of a random experiment and

$P(A) = 0.7$, $P(B) = 0.5$ and $P(A \cap B) = 0.3$

, find : $P(\acute{A})$, $P(A - B)$ and $P(A \cup B)$

[b] If the set of zeroes of the function f where $f(x) = x^2 - 10x + a$ is {5}

, then find the value of a

5 **[a] Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :**

$3x + y = 3$, $2x - y = 7$

[b] Find n (x) in its simplest form , showing the domain where :

$n(x) = \frac{x^2 + x + 1}{x^3 - 1} + \frac{x^2 - x - 2}{x^2 - 1}$

17 El-Menia Governorate

Answer the following questions : *(Calculators are allowed)*

1 Choose the correct answer from those given :

1. If k < zero , which of the following quantities is the greatest in the numerical value ?
   (a) $5 - k$ (b) $5 + k$ (c) $5k$ (d) $\frac{5}{k}$
2. If $a + b = 3$, $a^2 - ab + b^2 = 5$, then $a^3 + b^3 = \dots\dots$
   (a) 8 (b) 9 (c) 15 (d) 25
3. Half the number $4^6 = \dots\dots$
   (a) 2^3 (b) 2^6 (c) 4^3 (d) 2^{11}
4. The S.S of the two equations $x = 3$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is $\dots\dots$
   (a) $\{(3, 4)\}$ (b) $\{(4, 3)\}$ (c) $\mathbb{R}$ (d) $\varnothing$
5. If A , B are two mutually exclusive events from the sample space of a random experiment , then $P(A \cap B) = \dots\dots$
   (a) $\varnothing$ (b) zero (c) 0.5 (d) 1
6. The simplest form of the function $f : f(x) = \frac{2x}{x+1} + \frac{x}{x+1}$ is $\dots\dots$
   (a) $\frac{3x}{x+1}$ (b) 3 (c) 2 (d) $\frac{2}{x+1}$

2 **[a] Find the S.S. in $\mathbb{R}$ for the equation :** $3x^2 - 5x + 1 = 0$, using the general rule , rounding the result to one decimal place.

[b] Find n (x) in the simplest form , showing the domain :

$$n(x) = \frac{x^3 - 8}{x^2 - 5x + 6} \div \frac{x^2 + 2x + 4}{x - 3}$$

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations :** $2x + y = 1$, $x + 2y = 5$ algebraically.

[b] Find n (x) in the simplest form showing the domain where :

$$n(x) = \frac{x^2 - 2x - 15}{x^2 - 9} - \frac{10 - 2x}{x^2 - 8x + 15}$$

4 **[a] Find the S.S. in $\mathbb{R}^2$ of the two equations :** $x + y = 2$, $\frac{1}{x} + \frac{1}{y} = 2$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$,

prove that : $n_1 = n_2$

5 [a] If $n(X) = \frac{X^2 - 2X}{(X-2)(X^2+2)}$, **find :** $n^{-1}(X)$, showing the domain.

[b] If A , B are two events from the sample space of a random experiment

, $P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$

find : 1 $P(A \cup B)$ 2 $P(A - B)$

18 Assiut Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer :**

1 If $\frac{1}{3} X = 8$, then $\frac{1}{6} X = \dots\dots$

(a) $\frac{4}{3}$ (b) 4 (c) 48 (d) 16

2 If there are an infinite number of solutions of the equations $X + 6y = 3$, $2X + ky = 6$ in $\mathbb{R} \times \mathbb{R}$, then $k = \dots\dots$

(a) 4 (b) 6 (c) 12 (d) 21

3 The set of zeroes of the function f where $f(X) = X^2 - 3$ is $\dots\dots$

(a) $\{\sqrt{3}\}$ (b) $\{-\sqrt{3}\}$ (c) $\{3\}$ (d) $\{-\sqrt{3}, \sqrt{3}\}$

4 $\frac{3}{\sqrt{5}+\sqrt{2}} = \dots\dots$

(a) $3\sqrt{5}$ (b) $2\sqrt{5}$ (c) $\sqrt{5}-\sqrt{2}$ (d) $\sqrt{5}+\sqrt{2}$

5 If the curve of the function f where $f(X) = X^2 - m$ passes through the point (3 , 0) , then $m = \dots\dots$

(a) 3 (b) -3 (c) 6 (d) 9

6 If $X \subset S$ and $\grave{X}$ is the complementary event to event X , then $P(X \cap \grave{X}) = \dots\dots$

(a) zero (b) S (c) $\varnothing$ (d) 1

2 [a] **Find the solution set of the two following equations algebraically in $\mathbb{R} \times \mathbb{R}$:**

$3X - y + 4 = 0$, $y = 2X + 3$

[b] If $n(X) = \frac{X^2 - 49}{X^3 - 8} \div \frac{X + 7}{X - 2}$, then find $n(X)$ in the simplest form and identify the domain and find $n(1)$

3 [a] **By using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$X(X - 1) = 5$, rounding the results to one decimal place.

[b] If $n_1(x) = \frac{x^2-4}{x^2+x-6}$, $n_2(x) = \frac{x^3-x^2-6x}{x^3-9x}$

, **prove that :** $n_1(x) = n_2(x)$ for the values of x which belong to the common domain and find this domain.

4 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 2$, $x^2 + y^2 = 20$

[b] If $Z(f) = \{5\}$, $f(x) = x^3 - 3x^2 + a$, **find the value of :** a

5 [a] **Find n (x) in the simplest form , showing the domain of n :**

$n(x) = \frac{x-3}{x^2-7x+12} - \frac{x-3}{3-x}$

[b] If $S = \{2, 3, 4, 5, 6, 7, 8\}$, $A = \{2, 4, 6, 8\}$, $B = \{2, 3, 5, 7\}$

, **find :** 1 $P(A)$, $P(\grave{B})$ 2 $P(A \cup B)$

19 Souhag Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer :**

1 If $x \neq 0$, then $\frac{5x}{x^2+1} \div \frac{x}{x^2+1} =$ ....

(a) -5 (b) -1 (c) 1 (d) 5

2 $f : \mathbb{R} \longrightarrow \mathbb{R}$, $f(x) = a x^2 + b x + c$, where a , b , c $\in \mathbb{R}$, a = 0 , b ≠ 0 is a polynomial function of the .... degree in x

(a) second (b) third (c) first (d) zero

3 If $2^x = \frac{1}{4}$, then $x =$ ....

(a) 2 (b) -2 (c) 1 (d) -1

4 $\sqrt[3]{3\frac{3}{8}}$ .... $\sqrt{2\frac{1}{4}}$

(a) = (b) > (c) < (d) ≠

5 If there are an infinite number of solutions in $\mathbb{R} \times \mathbb{R}$ of the two equations :

$x + 4y = 7$, $3x + ky = 21$, then k = ...

(a) 4 (b) 7 (c) 21 (d) 12

6 If $A \subset S$ of a random experiment and $P(\grave{A}) = 2 P(A)$, then $P(A) =$ ....

(a) $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) $\frac{1}{3}$ (d) 1

2 [a] By using the general formula (rounding the results to one decimal digit) , find in $\mathbb{R}$ the solution set of the equation : $x(x-1)=4$

[b] If $n_1(x)=\dfrac{x^2}{x^3-x^2}$, $n_2(x)=\dfrac{x^3+x^2+x}{x^4-x}$, **prove that :** $n_1=n_2$

3 [a] **Find the solution set of the following equations in $\mathbb{R}\times\mathbb{R}$:**

$x-y=0$, $x^2+xy+y^2=27$

[b] If $n(x)=\dfrac{x^2-2x}{x^2-3x+2}$, **then find :** $n^{-1}(x)$ in the simplest form showing the domain of n^{-1}

4 [a] **Solve in $\mathbb{R}\times\mathbb{R}$:** $2x-y=5$, $x+y=4$

[b] **Simplify :** $n(x)=\dfrac{x^2+2x}{x^2-4}-\dfrac{2x-6}{x^2-5x+6}$, showing the domain.

5 [a] **Simplify :** $n(x)=\dfrac{x^3-8}{x^2+x-6}\times\dfrac{x+3}{x^2+2x+4}$, showing the domain.

[b] If A , B are two mutually exclusive events of a random experiment and $P(A)=0.3$, $P(B)=0.6$, $P(A\cap B)=0.2$, **find :** $P(\acute{A})$, $P(A\cup B)$

20 Qena Governorate

Answer the following questions : *(Calculators are permitted)*

1 **Choose the correct answer :**

1. The domain of the function f where $f(x)=\dfrac{x-2}{x^2+1}$ is ....
   (a) $\mathbb{R}-\{-1\}$ (b) $\mathbb{R}-\{1,-1\}$ (c) $\mathbb{R}-\{1\}$ (d) $\mathbb{R}$
2. $10+(10)^2+(10)^3=$ ....
   (a) 1000 (b) 3000 (c) 1110 (d) 1010
3. The two straight lines : $x-y=0$, $3x+2y=0$ intersect at the point ....
   (a) (0 , 0) (b) (1 , 1) (c) (3 , 0) (d) (0 , 2)
4. $\sqrt{64+36}=8+$ ....
   (a) 9 (b) 2 (c) 6 (d) 10
5. If $P(A)=3P(\acute{A})$, then $P(A)=$ ....
   (a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) $\frac{1}{3}$
6. If $ab=3$, $ab^2=12$, then $b=$ ....
   (a) 4 (b) 2 (c) -2 (d) ± 2

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$x - 2 = 0 \quad , \quad y^2 - 3xy + 5 = 0$

[b] **Find n (x) in the simplest form , showing the domain where :** $n(x) = \frac{5}{x-3} + \frac{4}{3-x}$

3 [a] Graph the function f where $f(x) = x^2 - 2x + 3$ over the interval $[-1, 3]$

, then from the graph find in $\mathbb{R}$ the solution set of the equation $x^2 - 2x + 3 = 0$

[b] If $n(x) = \frac{x^2 + x - 12}{x^2 + 5x + 4}$, find $n^{-1}(x)$, showing the domain of n^{-1} , then find $n^{-1}(0)$

4 [a] **Find in $\mathbb{R}$ the solution set of the equation :**

$2x^2 - 5x + 1 = 0$, approximating the results to two decimals.

[b] If $n_1(x) = \frac{x^3 + 1}{x^3 - x^2 + x}$, $n_2(x) = \frac{x^3 + x^2 + x + 1}{x^3 + x}$, **prove that :** $n_1 = n_2$

5 [a] If A and B are two events from the sample space S , P (A) = 0.8 , P (B) = 0.7

, P (A ∩ B) = 0.6 , **find :**

1 P (Á) 2 P (A ∪ B) 3 P (A – B)

[b] **Find n (x) in the simplest form , showing the domain where :**

$n(x) = \frac{x^2 + 2x}{x^3 - 27} \div \frac{x + 2}{x^2 + 3x + 9}$

21 Luxor Governorate

Answer the following questions :

1 **Choose the correct answer :**

1 If $f(x) = 9$, then $3 f(-x) =$ ....

(a) – 3 (b) 6 (c) – 12 (d) 27

2 The set of zeroes of f : $f(x)$ = zero is ....

(a) ∅ (b) $\mathbb{R}$ (c) $\mathbb{R} - \{0\}$ (d) zero

3 If $xy = 4$, $xz = 4$, $yz = 4$, where $x , y , z \in \mathbb{R}^+$, then $xyz =$ ....

(a) 64 (b) 12 (c) 8 (d) 4

4 If A , B are two events of the sample space of a random experiment , A ⊂ B , P (A) = 0.2 and P (B) = 0.6 , then P (B – A) = ...

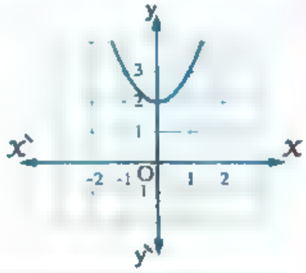
(a) 0.2 (b) 0.4 (c) 0.6 (d) 0.8

5 $\frac{1}{3}$ the number $(27)^3$ is ....

(a) 3^3 (b) 3^4 (c) 3^6 (d) 3^8

6 **From the opposite figure :**

The S.S. of $f(x) = 0$ in $\mathbb{R}$ is ....



(a) $\varnothing$ (b) $\{2\}$

(c) $\{0\}$ (d) $\{(0 , 2)\}$

2 [a] **Find the common domain of the functions defined by the following rules :**

$\frac{x-4}{x^2-5x+6}$, $\frac{2x}{x^3-9x}$

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $y + 2x = 7$, $2x^2 + x + 3y = 19$

3 [a] **Find n (x) in the simplest form and state the domain :**

$$n(x) = \frac{x-3}{x^2-7x+12} - \frac{x-3}{3-x}$$

[b] A class has 40 students , 30 of them succeeded in math , 24 succeeded in science and 20 of them succeeded in both math and science. **If one student is chosen at random , find the probability that the student :**

1 Succeeded in math.
2 Succeeded in science only.
3 Succeeded in one of them at least.

4 [a] **Find in $\mathbb{R}$ the solution set of :** $2x^2 - x - 2 = 0$ by using the general rule where $(\sqrt{17} \simeq 4.12)$

[b] If $n_1(x) = \frac{x}{x^2-1}$, $n_2(x) = \frac{5x}{5x^2-5}$, **prove that :** $n_1 = n_2$

5 [a] **Find n (x) in the simplest form and state the domain if :**

$$n(x) = \frac{x^2-3x}{2x^2-x-6} \div \frac{2x^2-3x}{4x^2-9}$$

[b] **Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$x + 2y = 8$, $3x + y = 9$

22 Aswan Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer :**

1 The solution set of the two equations $x + y = 0$, $y - 5 = 0$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\varnothing$ (b) $\mathbb{R}$ (c) $\{(-5 , 5)\}$ (d) $\{(5 , -5)\}$

2 If $2^3 \times 5^3 = 10^x$, then $x =$ ....

(a) zero (b) 3 (c) 6 (d) 9

3 If $a^2 - b^2 = 6$, $a - b = \sqrt{3}$, then $(a + b)^2 =$ ....

(a) 3 (b) 6 (c) 9 (d) 12

4 If $(5 , x - 4) = (y , 2)$, then $x + y =$ ....

(a) 6 (b) 8 (c) 11 (d) 25

5 If $f(x) = x^2 + x + a$ and the set of zeroes of the function f is $\{1 , -2\}$, then $a =$ ....

(a) 2 (b) 1 (c) -1 (d) -2

6 If $A \subset B$, then $P(A \cup B) =$ ....

(a) zero (b) $P(A)$ (c) $P(B)$ (d) $P(A \cap B)$

2 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$3x - y = -4$, $y - 2x = 3$

[b] Find n (x) in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^2 + 4x + 3}{x^3 - 27} \div \frac{x + 3}{x^2 + 3x + 9}$$

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$x - y = 1$, $x^2 + y^2 = 25$

[b] If $n(x) = \dfrac{x^2 - 2x}{x^2 - 3x + 2}$

, **find :** $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}

4 **[a] Using the general rule , find the solution set of the following equation in $\mathbb{R}$:**

$2x^2 - 5x + 1 = 0$

[b] Find n (x) in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^2 + 2x}{x^2 - 4} - \frac{2x - 6}{x^2 - 5x + 6}$$

5 [a] If $n_1(x) = \dfrac{2x}{2x + 8}$, $n_2(x) = \dfrac{x^2 + 4x}{x^2 + 8x + 16}$, **prove that :** $n_1 = n_2$

[b] If A , B are two mutually exclusive events and $P(A) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$

, **find :** $P(B)$

23 New Valley Governorate

Answer the following questions : *(Calculator is allowed)*

1 Choose the correct answer from those given :

1. The degree of the function $f : f(x) = x + x^2 - 5$ is the ....
   (a) first (b) second (c) third (d) fourth
2. The set of zeroes of the function $f : f(x) = 7$ is ....
   (a) $\varnothing$ (b) $\{7\}$ (c) $\mathbb{R}$ (d) $\mathbb{R} - \{7\}$
3. If $a + b = 3$ and $(a + b)(a + 1) = 15$, then $ab =$ ....
   (a) -4 (b) 4 (c) -6 (d) 6
4. The number of solutions of the equation : $x = 3$ in $\mathbb{R} \times \mathbb{R}$ is ....
   (a) zero (b) 1 (c) 2 (d) an infinite number.
5. If A and B are two mutually exclusive events of a random experiment , then : $P(A \cap B) =$ ....
   (a) $P(A)$ (b) $\varnothing$ (c) zero (d) $P(B)$
6. If n_1 and n_2 are two algebraic fractions , the domain of $n_1 = \mathbb{R} - X_1$ (where X_1 is the set of zeroes of the denominator of n_1) and the domain of $n_2 = \mathbb{R} - X_2$ (where X_2 is the set of zeroes of the denominator of n_2) , then the common domain of n_1 and n_2 equals ....
   (a) $X_1 \cup X_2$ (b) $X_1 \cap X_2$
   (c) $(\mathbb{R} - X_1) \cup (\mathbb{R} - X_2)$ (d) $(\mathbb{R} - X_1) \cap (\mathbb{R} - X_2)$

2 **[a] Find n (x) in its simplest form , showing the domain of n :**

$$n(x) = \frac{x^2 - 4}{x^2 + 5x + 6}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations :

$x^2 + y^2 = 17$, $y - x = 3$

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations algebraically :**

$3x - 2y = 4$, $x + 3y = 5$

[b] Find n (x) in its simplest form , showing the domain of n :

$$n(x) = \frac{x}{x + 2} \div \frac{x^2 - 2x}{\frac{1}{2}x^2 - 2}$$

4 [a] If $n_1(x) = \dfrac{x^3 - 1}{x^3 + x^2 + x}$, $n_2(x) = \dfrac{x^3 - x^2 + x - 1}{x^3 + x}$

, then prove that : $n_1 = n_2$

[b] **Find n (x) in the simplest form, showing the domain of n :**

$n(x) = \dfrac{3x}{x^2 - 3x} - \dfrac{x}{x - 3}$

5 [a] If A and B are two events from the sample space of a random experiment, and

$P(A) = \frac{1}{5}$, $P(B) = \frac{3}{5}$, $P(A \cap B) = \frac{1}{10}$ **, then find :**

1 $P(\acute{A})$ 2 $P(A \cup B)$ 3 $P(B - A)$

[b] Draw the graph of the function $f : f(x) = x^2 - 2x + 1$ in the interval $[-2, 4]$

, then from the graph find in $\mathbb{R}$ the solution set of the equation : $x^2 - 2x + 1 = 0$

24 South Sinai Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 If $\frac{x}{y} = \frac{3}{4}$, then $\frac{4x}{3y} = \dots\dots\dots\dots$

(a) 1 (b) $\frac{4}{3}$ (c) $\frac{9}{16}$ (d) $\frac{16}{9}$

2 If $x^2 = 25$, then $x = \dots\dots\dots\dots$

(a) -5 (b) ± 5 (c) 5 (d) 10

3 If $x + 3y = 7$, then $x + 3(y + 5) = \dots\dots\dots\dots$

(a) 3 (b) 7 (c) 22 (d) 21

4 The probability of the impossible event equals $\dots\dots\dots\dots$

(a) 1 (b) $\frac{1}{2}$ (c) -1 (d) zero

5 The domain of $f : f(x) = \dfrac{x + 5}{x^2 - 4}$ is $\dots\dots\dots\dots$

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{-2, 2\}$ (c) $\mathbb{R} - \{-2\}$ (d) $\mathbb{R} - \{2\}$

6 If A and B are mutually exclusive events, then $P(A \cap B) = \dots\dots\dots\dots$

(a) $\varnothing$ (b) zero (c) 0.56 (d) 1

2 [a] **Find in $\mathbb{R}$ the solution set of the equation :** $x^2 - 2x - 6 = 0$ by using the formula , approximating the result to the nearest two decimal places.

[b] **Find n (x) in the simplest form , showing the domain of n :**

$$n(x) = \frac{x}{x+2} + \frac{2x^3}{x^3+2x^2}$$

3 [a] **Find n (x) in the simplest form , showing the domain of n :**

$$n(x) = \frac{x^2+2x}{x^3-8} \times \frac{x^2+2x+4}{x+2}$$

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations algebraically :**

$2x - y = 3$, $x + 2y = 4$

4 [a] If $n_1(x) = \frac{x}{x^2+x}$, $n_2(x) = \frac{x^4-x^3+x^2}{x^5+x^2}$, **prove that :** $n_1 = n_2$

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$x - y = 7$, $xy = 60$

5 [a] **Find n (x) in the simplest form , showing the domain of n where :**

$$n(x) = \frac{x+1}{x^2+3x+2} - \frac{x+2}{x^2-4}$$

[b] If A and B are mutually exclusive events of the sample space of a random experiment and $P(A) = \frac{1}{4}$, $P(A \cup B) = \frac{5}{12}$, **find :** P (B)

25 North Sinai Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 One of the solutions of the inequality : $2x - 3 > 3$ where $x \in \mathbb{Z}$ is ....

(a) $x = 3$ (b) $x = -3$ (c) $x = 7$ (d) $x = -7$

2 If $x - y = 3$, $x + y = 9$, then y = ...

(a) 6 (b) – 6 (c) 3 (d) – 3

3 If $a = \sqrt{3}$, $b = \frac{1}{\sqrt{3}}$, then $a^{50} \times b^{51}$ = ...

(a) 3 (b) $\frac{1}{3}$ (c) $\sqrt{3}$ (d) $\frac{1}{\sqrt{3}}$

4 If $n(x) = \frac{x}{x+5}$, then the domain of n^{-1} = ...

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{0\}$ (c) $\mathbb{R} - \{5\}$ (d) $\mathbb{R} - \{0, -5\}$

5 If $x^2 - y^2 = 15$, $x - y = 3$, then $x + y$ = ...

(a) 5 (b) 13 (c) 18 (d) 45

6 If a regular die is tossed once , the probability of appearance of a number less than 3 equals ....

(a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{2}{3}$

2 [a] If A , B are two events of a random experiment and

$P(A) = \frac{1}{2}$, $P(A \cap B) = \frac{1}{5}$, $P(B) = \frac{2}{5}$

, **find :** 1 $P(A \cup B)$ 2 $P(A - B)$

[b] **Find the common domain of n_1 , n_2 :** if $n_1(x) = \frac{-1}{x^2 - 9}$, $n_2(x) = \frac{7}{x}$

3 [a] **By using the general rule , find in $\mathbb{R}$ the solution set of the equation :** $x^2 - 2x = 4$, rounding the results to two decimal places.

[b] **Find n (x) in the simplest form , showing the domain :**

$n(x) = \frac{x^2 - 2x}{x^2 - 4} + \frac{2x + 6}{x^2 + 5x + 6}$

4 [a] **Find the solution set of the following two equations in $\mathbb{R} \times \mathbb{R}$:**

$x - y = 0$, $xy = 16$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, **prove that :** $n_1 = n_2$

5 [a] If $n(x) = \frac{x^2 - 2x + 1}{x^3 - 1} \div \frac{x - 1}{x^2 + x + 1}$

, **find :** n (x) in the simplest form , showing the domain of n

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations graphically :**

$x + y = 4$, $2x - y = 2$

26 Red Sea Governorate

Answer the following questions : ***(Calculators are allowed)***

1 **Choose the correct answer from those given :**

1 The solution set of the two equations : $x + 2 = 0$, $y = 3$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) {(2 , 3)} (b) {(3 , 2)} (c) {(−2 , 3)} (d) {(3 , −2)}

2 If $2^5 \times 3^5 = 6^m$, then m = ...

(a) 10 (b) 5 (c) 6 (d) 25

3 If $A \subset S$ of a random experiment, $P(A') = 2P(A)$, then P (A) ....

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1

4 If $(5 , x-4) = (y , 3)$, then $x + y =$ ....

(a) 25 (b) 12 (c) 8 (d) 6

5 The set of zeroes of f where $f(x) =$ zero is ....

(a) $\varnothing$ (b) zero (c) $\mathbb{R}$ (d) $\mathbb{R} - \{0\}$

6 $(-1)^{15} + (-1)^{14} =$ ....

(a) 1 (b) 2 (c) -2 (d) zero

2 [a] **Find the S.S of the following two equations in $\mathbb{R} \times \mathbb{R}$:**

$2x - y = 3$, $x + 2y = 4$

[b] **Find n (x) in the simplest form , showing the domain :** $n(x) = \frac{x^2}{x-1} + \frac{x}{1-x}$

3 [a] **By using the general rule , solve the equation :** $x^2 - x = 4$ in $\mathbb{R}$

, approximating the result to the nearest two decimals

[b] **Prove that $n_1 = n_2$ if :** $n_1(x) = \frac{x^3+1}{x^3-x^2+x}$, $n_2(x) = \frac{x^3+x^2+x+1}{x^3+x}$

4 [a] **Find the S.S. in $\mathbb{R} \times \mathbb{R}$ of the two equations :** $x - y = 1$, $x^2 + y^2 = 25$

[b] If $n(x) = \frac{x^2 - 2x}{x^2 - 5x + 6}$

1 **Find :** $n^{-1}(x)$ and identify the domain of n^{-1}

2 If $n^{-1}(x) = 2$, what is the value of x ?

5 [a] **Find n (x) in the simplest form , showing the domain where :**

$n(x) = \frac{x^3-8}{x^2+x-6} \times \frac{x+3}{x^2+2x+4}$

[b] If A and B are two events from the sample space of a random experiment and

$P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$

, **find :** 1 $P(A \cup B)$ 2 $P(A - B)$

27 Matrouh Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

1 The two straight lines : $x + 2y = 1$, $2x + 4y = 6$ are ....

(a) parallel. (b) intersecting.

(c) perpendicular. (d) intersecting and perpendicular.

2 The solution set of the equation : $x^2 = 2x$ in $\mathbb{Z}$ is ....

(a) $\{2\}$ (b) $(0, 2)$ (c) $\{0, 2\}$ (d) $\{(0, 2)\}$

3 The intersection point of the two straight lines : $x = 1$ and $y - 2 = 0$ lies on the .... quadrant.

(a) first. (b) second. (c) third. (d) fourth.

4 If $A \subset B$, then $P(A \cup B) =$ ....

(a) $P(A)$ (b) $P(B)$ (c) $P(A \cap B)$ (d) zero

5 If x is a negative number, then the largest number from the following is ....

(a) $5 + x$ (b) $5x$ (c) $5 - x$ (d) $\frac{5}{x}$

6 The set of zeroes of the function f where $f(x) = 4$ is ....

(a) zero (b) $\{4\}$ (c) $\{0, 4\}$ (d) $\varnothing$

2 [a] **By using the general formula, find in $\mathbb{R}$ the solution set of the equation :**

$x + \frac{1}{x} + 3 = 0$ where $x \neq 0$, rounding the results to two decimal places.

[b] If $n(x) = \frac{x^2 - 1}{x^2 - x}$, then reduce $n(x)$ to the simplest form, showing the domain of n

3 [a] **Simplify :** $n(x) = \frac{x - 1}{x^2 - 1} \div \frac{x^2 - 5x}{x^2 - 4x - 5}$, showing the domain.

[b] If the sum of two positive numbers is 9, and the difference between their squares is 27, find the two numbers.

4 [a] If A, B are two events from the sample space of a random experiment and

$P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$

, **find :** 1 $P(A \cup B)$ 2 $P(A - B)$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, **then prove that :** $n_1 = n_2$

5 [a] **Find n (x) in the simplest form, showing the domain where :**

$n(x) = \frac{3x}{x^2 - x - 2} + \frac{x - 1}{1 - x^2}$

[b] **Find the solution set of the following two equations graphically in $\mathbb{R} \times \mathbb{R}$:**

$y = x + 4$, $x + y = 4$

Answers of school book examinations in algebra and probability

Model 1

1

1 b 2 a 3 d 4 c 5 b 6 a

2

[a] $\because 2x^2 - 5x + 1 = 0$

$\therefore a = 2 \quad , \quad b = 5 \quad , \quad c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore x = 2.3$ or $x = 0.2$

$\therefore$ The S.S. $= \{2.3 , 0.2\}$

[b] $\because n(x) = \frac{x-3}{(x-3)(x-4)} - \frac{4}{x(x-4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3 , 4 , 0\}$

$, n(x) = \frac{1}{x-4} - \frac{4}{x(x-4)} = \frac{x-4}{x(x-4)} = \frac{1}{x}$

3

[a] $\because x - y = 0 \quad \therefore x = y$ (1)

$, x^2 + xy + y^2 = 27$ (2)

Substituting from (1) in (2) :

$\therefore y^2 + y^2 + y^2 = 27 \quad \therefore 3y^2 = 27$

$\therefore y^2 = 9 \quad \therefore y = 3$ or $y = -3$

Substituting in (1) : $\therefore x = 3$ or $x = -3$

$\therefore$ The S.S. $= \{(3 , 3) , (-3 , -3)\}$

[b] $\because n(x) = \frac{(x+3)(x+1)}{(x-3)(x^2+3x+9)} \div \frac{x+3}{x^2+3x+9}$

$\therefore$ The domain of $n = \mathbb{R} - \{3 , -3\}$

$, n(x) = \frac{(x+3)(x+1)}{(x-3)(x^2+3x+9)} \times \frac{x^2+3x+9}{x+3}$

$= \frac{x+1}{x-3}$

$, n(2) = \frac{2+1}{2-3} = \frac{3}{-1} = -3$

$, n(-3)$ undefined because $-3 \notin$ the domain of n

4

[a] Let the length be x cm. and the width be y cm.

$\therefore x = y + 4$ (1)

$, \because 28 = 2(x + y) \quad \therefore x + y = 14$ (2)

Substituting from (1) in (2) :

$\therefore y + 4 + y = 14 \quad \therefore 2y = 10 \quad \therefore y = 5$

Substituting in (1) : $\therefore x = 9$

$\therefore$ The length = 9 cm. , the width = 5 cm.

$\therefore$ The area $= 9 \times 5 = 45$ cm^2.

[b] 1 $\because n(x) = \frac{x(x-2)}{(x-2)(x-1)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x-1)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0 , 1 , 2\}$

$, n^{-1}(x) = \frac{x-1}{x}$

2 $\because n^{-1}(x) = 3 \quad \therefore \frac{x-1}{x} = 3$

$\therefore 3x = x - 1 \quad \therefore 3x - x = -1$

$\therefore 2x = -1 \quad \therefore x = \frac{-1}{2}$

5

[a] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0 , 1\}$
$, \because n_1(x) = \frac{1}{x-1}$ } (1)

$\because n_2(x) = \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0 , 1\}$
$, n_2(x) = \frac{1}{x-1}$ } (2)

From (1) and (2) : $\therefore n_1 = n_2$

[b] 1 $P(A \cap B) = \frac{2}{6} = \frac{1}{3}$

2 $P(A - B) = \frac{1}{6}$

3 The probability of non-occurrence of the event $A = \frac{3}{6} = \frac{1}{2}$

Model 2

1

1 a 2 d 3 a 4 b 5 c 6 a

2

[a] $\because 3x^2-5x+1=0$

$\therefore a=3 \ , \ b=-5 \ , \ c=1$

$\therefore x=\frac{5\pm\sqrt{(-5)^2-4\times3\times1}}{2\times3}=\frac{5\pm\sqrt{25-12}}{6}$

$=\frac{5\pm\sqrt{13}}{6}$

$\therefore x\approx1.43$ or $x\approx0.23$

$\therefore$ The S.S. $=\{1.43 , 0.23\}$

[b] $\because n(x)=\frac{(x-2)(x^2+2x+4)}{(x-2)(x+3)}\times\frac{x+3}{x^2+2x+4}$

$\therefore$ The domain of $n=\mathbb{R}-\{2 , -3\}$

$, n(x)=1$

3

[a] $\because x-y=1$ $\therefore x=y+1$ (1)

$, x^2+y^2=25$ (2)

Substituting from (1) in (2) :

$\therefore (y+1)^2+y^2=25$

$\therefore y^2+2y+1+y^2-25=0$

$\therefore 2y^2+2y-24=0$ $\therefore y^2+y-12=0$

$\therefore (y-3)(y+4)=0$

$\therefore y=3$ or $y=-4$

Substituting in (1) : $\therefore x=4$ or $x=-3$

$\therefore$ The S.S. $=\{(4 , 3) , (-3 , -4)\}$

[b] 1 $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$=0.3+0.6-0.2=0.7$

2 $P(A-B)=P(A)-P(A\cap B)$

$=0.3-0.2=0.1$

4

[a] $\because 2x-y=3$ $\therefore y=2x-3$ (1)

$, x+2y=4$ (2)

Substituting from (1) in (2) :

$\therefore x+2(2x-3)=4$

$\therefore x+4x-6=4$ $\therefore 5x=10$ $\therefore x=2$

Substituting in (1) : $\therefore y=1$

[b] $\because n(x)=\frac{x(x+3)}{(x+3)(x-3)}\div\frac{2x}{x+3}$

$\therefore$ The domain of $n=\mathbb{R}-\{-3 , 3 , 0\}$

$, n(x)=\frac{x}{x-3}\times\frac{x+3}{2x}=\frac{x+3}{2(x-3)}$

5

[a] $\because n(x)=\frac{x(x+2)}{(x-2)(x+2)}+\frac{x+3}{(x-2)(x-3)}$

$\therefore$ The domain of $n=\mathbb{R}-\{2 , -2 , 3\}$

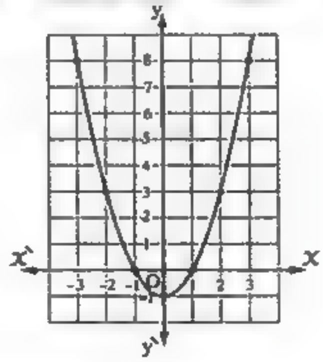
$, n(x)=\frac{x}{(x-2)}+\frac{x+3}{(x-2)(x-3)}$

$=\frac{x(x-3)+x+3}{(x-2)(x-3)}=\frac{x^2-3x+x+3}{(x-2)(x-3)}$

$=\frac{x^2-2x+3}{(x-2)(x-3)}$

[b] $f(x)=x^2-1$

x	-3	-2	-1	0	1	2	3
y	8	3	0	-1	0	3	8



From the graph :

$\therefore$ The S.S. $=\{-1 , 1\}$

Model examination for the merge students

1

1 0
2 $\frac{1}{x-2}$
3 $\frac{2}{3}$
4 second
5 second
6 $\{5\}$

2

1 a
2 b
3 c
4 b
5 c
6 a

3

1 ✗
2 ✗
3 ✓
4 ✓
5 ✗
6 ✓

4

1 $\{(2, 1)\}$
2 $\frac{-b \pm \sqrt{b^2-4ac}}{2a}$
3 $\mathbb{R}-\{1, -1\}$
4 $\frac{x}{x^2+4}$
5 $\{5\}$
6 $\frac{1}{3}$

Answers of governorates' examinations of algebra & probability

1 Cairo

1

1 d 2 c 3 d 4 b 5 d 6 c

2

[a] Let x and y be two real numbers

$\therefore x + y = 40$ (1)

, $x - y = 10$ (2)

Adding (1) and (2) : $\therefore 2x = 50$ $\therefore x = 25$

Substituting in (1) : $\therefore y = 15$

$\therefore$ The two real numbers are 25 , 15

[b] $\because n(x) = \frac{x}{x-2} - \frac{2(x+2)}{(x+2)(x-2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2\}$

, $n(x) = \frac{x}{x-2} - \frac{x}{x-2} = \frac{x-2}{x-2} = 1$

3

[a] $\because x - 3 = 0$ $\therefore x = 3$ (1)

, $x^2 + y^2 = 25$ (2)

Substituting from (1) in (2) : $\therefore 9 + y^2 = 25$

$\therefore y^2 = 16$ $\therefore y = 4$ or $y = -4$

$\therefore$ The S.S. $= \{(3, 4), (3, -4)\}$

[b] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, 1\}$

, $n_1(x) = \frac{1}{x-1}$, $\because n_2(x) = \frac{x^2+x+1}{(x-1)(x^2+x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{1\}$

, $n_2(x) = \frac{1}{x-1}$

$\therefore n_1(x) = n_2(x)$ for all the values of $x \in \mathbb{R} - \{0, 1\}$

4

[a] $\because n(x) = \frac{(x-2)(x^2+2x+4)}{(x+3)(x-2)} \times \frac{x+3}{x^2+2x+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -3\}$, $n(x) = 1$

[b] $\because 2x^2 + 5x - 6 = 0$ $\therefore a = 2, b = 5, c = -6$

$\therefore x = \frac{-5 \pm \sqrt{(5)^2 - 4 \times 2 \times (-6)}}{2 \times 2} = \frac{-5 \pm \sqrt{73}}{4}$

$\therefore x \approx 0.9$ or $x \approx -3.4$

$\therefore$ The S.S. $= \{0.9, -3.4\}$

5

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.7 + 0.5 - 0.3 = 0.9$

2 $P(A - B) = P(A) - P(A \cap B) = 0.7 - 0.3 = 0.4$

[b] 1 $\because n(x) = \frac{x}{x+3}$ $\therefore n^{-1}(x) = \frac{x+3}{x}$

, the domain of $n^{-1} = \mathbb{R} - \{0, -3\}$

2 $\because n^{-1}(x) = 4$ $\therefore \frac{x+3}{x} = 4$

$\therefore 4x = x + 3$ $\therefore 3x = 3$ $\therefore x = 1$

2 Giza

1

1 c 2 d 3 b 4 a 5 c 6 b

2

[a] $\because 2x^2 - 5x + 1 = 0$ $\therefore a = 2, b = -5, c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore x \approx 2.28$ or $x \approx 0.22$

$\therefore$ The S.S. $= \{2.28, 0.22\}$

[b] $\because n(x) = \frac{(x+2)(x-2)}{(x-2)(x^2+2x+4)} \div \frac{(x+2)(x-3)}{x^2+2x+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2, 3\}$

, $n(x) = \frac{(x+2)(x-2)}{(x-2)(x^2+2x+4)} \times \frac{x^2+2x+4}{(x+2)(x-3)}$

$= \frac{1}{x-3}$

3

[a] Let the lengths of the two sides of the right angle be x cm. and y cm.

$\therefore x + y + 10 = 24$ $\therefore x + y = 14$

$\therefore x = 14 - y$ (1)

, $x^2 + y^2 = 100$ (2)

Substituting from (1) in (2) : $\therefore (14 - y)^2 + y^2 = 100$

$\therefore 196 - 28y + y^2 + y^2 - 100 = 0$

$\therefore 2y^2 - 28y + 96 = 0$ (Dividing by 2)

$\therefore y^2 - 14y + 48 = 0$ $\therefore (y-6)(y-8) = 0$

$\therefore y = 6$ or $y = 8$

Substituting in (1) : $\therefore x = 8$ or $x = 6$

$\therefore$ The side lengths of the right angle are 6 cm. and 8 cm.

[b] $\because$ A , B are two mutually exclusive events

$\therefore P(A \cup B) = P(A) + P(B) = 0.2 + 0.5 = 0.7$

, $P(A - B) = P(A) = 0.2$

4

[a] [1] $\therefore n(x) = \frac{x(x-3)}{(x-2)(x-3)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x-3)}{x(x-3)}$

, the domain of $n^{-1} = \mathbb{R} - \{0, 3, 2\}$

$\therefore n^{-1}(x) = \frac{x-2}{x}$

[2] $\because n^{-1}(x) = 2$ $\quad\therefore \frac{x-2}{x} = 2$

$\therefore x - 2 = 2x$ $\quad\therefore x = -2$

[b] $\because x + 2y = 4$ (1)

, $3x - y = 5$ (multiplying by 2)

$\therefore 6x - 2y = 10$ (2)

Adding (1) and (2) : $\therefore 7x = 14$ $\quad\therefore x = 2$

Substituting in (1) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(2, 1)\}$

5

[a] $\because n(x) = \frac{x^2}{x-1} - \frac{x}{x-1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$, $n(x) = \frac{x(x-1)}{x-1}$

$\therefore n(x) = x$

[b] $\because n_1(x) = \frac{(x+3)(x-2)}{(x+2)(x-2)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_1 = \mathbb{R} - \{-2, 2\} \\ , n_1(x) = \frac{x+3}{x+2}\end{array}\right\}$ (1)

, $\because n_2(x) = \frac{(x+3)(x-3)}{(x-3)(x+2)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_2 = \mathbb{R} - \{3, -2\} \\ , n_2(x) = \frac{x+3}{x+2}\end{array}\right\}$ (2)

From (1) and (2) : $\therefore n_1 \neq n_2$

Because the domain of $n_1 \neq$ the domain of n_2

3 Alexandria

1

[1] b	[2] d	[3] b	[4] d	[5] a	[6] a

2

[a] $\because x - y = 0$ $\quad\therefore x = y$ (1)

, $x^2 + xy + y^2 = 27$ (2)

Substituting from (1) in (2) : $\therefore y^2 + y^2 + y^2 = 27$

$\therefore 3y^2 = 27$ $\quad\therefore y^2 = 9$

$\therefore y = 3$ or $y = -3$

Substituting in (1) : $\therefore x = 3$ or $x = -3$

$\therefore$ The S.S. $= \{(3, 3), (-3, -3)\}$

[b] $\because n_1(x) = \frac{(x-3)(x+4)}{(x+1)(x+4)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-1, -4\}$

, $n_1(x) = \frac{x-3}{x+1}$

, $\because n_2(x) = \frac{(x-3)(x+1)}{(x+1)(x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-1\}$, $n_2(x) = \frac{x-3}{x+1}$

$\therefore n_1(x) = n_2(x)$ for all values of $x \in \mathbb{R} - \{-1, -4\}$

3

[a] $\because 2x^2 + 5x = 0$ $\quad\therefore a = 2, b = 5, c = 0$

$\therefore x = \frac{-5 \pm \sqrt{(5)^2 - 4 \times 2 \times 0}}{2 \times 2} = \frac{-5 \pm 5}{4}$

$\therefore x = 0$ or $x = -2.5$

$\therefore$ The S.S. $= \{0, -2.5\}$

[b] $\because n(x) = \frac{(x-1)(x^2+x+1)}{x(x-1)} \times \frac{x+3}{x^2+x+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{0, 1\}$, $n(x) = \frac{x+3}{x}$

4

[a] $\because 2x + y = 1$ $\quad\therefore y = 1 - 2x$ (1)

, $x + 2y = 5$ (2)

Substituting from (1) in (2) :

$\therefore x + 2(1 - 2x) = 5$ $\quad\therefore x + 2 - 4x = 5$

$\therefore -3x = 3$ $\quad\therefore x = -1$

Substituting in (1) : $\therefore y = 3$

$\therefore$ The S.S. $= \{(-1, 3)\}$

[b] $\because n(x) = \frac{x(x-1)}{(x-1)(x+1)} + \frac{x+5}{(x+1)(x+5)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1, -1, -5\}$

, $n(x) = \frac{x}{x+1} + \frac{1}{x+1} = \frac{x+1}{x+1} = 1$

5

[a] [1] $\because n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 2\}$

, $n^{-1}(x) = \frac{x^2+2}{x}$

2 $\because n^{-1}(x)=3 \quad \therefore \frac{x^2+2}{x}=3$

$\therefore x^2+2=3x \quad \therefore x^2-3x+2=0$

$\therefore (x-2)(x-1)=0$

$\therefore x=2$ (refused) or $x=1$

[b] A and B are mutually exclusive events

$\therefore P(A \cup B)=P(A)+P(B)$

$\therefore P(B)=P(A \cup B)-P(A)=\frac{7}{12}-\frac{1}{3}=\frac{1}{4}$

4 El-Kalyoubia

1

1 b 2 d 3 c 4 a 5 c 6 c

2

[a] 1 $P(A \cup B)=P(A)+P(B)-P(A \cap B)$

$=0.8+0.7-0.6=0.9$

2 $P(\acute{A})=1-P(A)=1-0.8=0.2$

[b] Let the length be x cm. and the width be y cm.

$\therefore x-y=4$ (1)

, $2(x+y)=28$ (Dividing by 2)

$\therefore x+y=14$ (2)

Adding (1) and (2) : $\therefore 2x=18 \quad \therefore x=9$

Substituting in (1) : $\therefore y=5$

$\therefore$ The length = 9 cm. , the width = 5 cm.

$\therefore$ The area of the rectangle $=9\times 5=45$ cm^2.

3

[a] $\because x-y=0 \quad \therefore x=y$ (1)

, $x^2+xy+y^2=27$ (2)

Substituting from (1) in (2) : $\therefore y^2+y^2+y^2=27$

$\therefore 3y^2=27 \quad \therefore y^2=9$

$\therefore y=3$ or $y=-3$

Substituting in (1) : $\therefore x=3$ or $x=-3$

$\therefore$ The S.S. $=\{(3,3),(-3,-3)\}$

[b] $\because n(x)=\frac{x(x+2)}{(x-3)(x^2+3x+9)}+\frac{x+2}{x^2+3x+9}$

$\therefore$ The domain of $n=\mathbb{R}-\{3,-2\}$

, $n(x)=\frac{x(x+2)}{(x-3)(x^2+3x+9)}\times\frac{x^2+3x+9}{x+2}$

$=\frac{x}{x-3}$

4

[a] $\because 2x^2-4x+1=0$

$\therefore a=2, b=-4, c=1$

$\therefore x=\frac{4\pm\sqrt{(-4)^2-4\times 2\times 1}}{2\times 2}=\frac{4\pm 2\sqrt{2}}{4}=\frac{2\pm\sqrt{2}}{2}$

$\therefore x\approx 1.7$ or $x\approx 0.3 \quad \therefore$ The S.S. $=\{1.7, 0.3\}$

[b] $\because n_1(x)=\frac{2x}{2(x+2)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{-2\}$, $n_1(x)=\frac{x}{x+2}$ (1)

, $\because n_2(x)=\frac{x(x+2)}{(x+2)(x+2)}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{-2\}$, $n_2(x)=\frac{x}{x+2}$ (2)

From (1) and (2) : $\therefore n_1=n_2$

5

[a] $\because n(x)=\frac{x^2+2x+4}{(x-2)(x^2+2x+4)}+\frac{(x-3)(x+3)}{(x+3)(x-2)}$

$\therefore$ The domain of $n=\mathbb{R}-\{2,-3\}$

, $n(x)=\frac{1}{x-2}+\frac{x-3}{x-2}=\frac{x-2}{x-2}=1$

[b] $\because$ The domain of $f=\mathbb{R}-\{2,k\}$

$\therefore$ where $x=2 \quad \therefore x^2-5x+m=0$

$\therefore 4-5\times 2+m=0 \quad \therefore m=6$

$\therefore f(x)=\frac{x}{x^2-5x+6}$

$\therefore f(x)=\frac{x}{(x-2)(x-3)}$

$\therefore$ The domain of $f=\mathbb{R}-\{2,3\} \quad \therefore k=3$

5 El-Sharkia

1

1 d 2 b 3 d 4 a 5 d 6 d

2

[a] $\because x(x-2)=1 \quad \therefore x^2-2x-1=0$

$\therefore a=1, b=-2, c=-1$

$\therefore x=\frac{2\pm\sqrt{(-2)^2-4\times 1\times(-1)}}{2\times 1}$

$=\frac{2\pm\sqrt{8}}{2}=\frac{2\pm 2\sqrt{2}}{2}=1\pm\sqrt{2}$

$\therefore x=1+\sqrt{2}$ or $x=1-\sqrt{2}$

$\therefore$ The S.S. $=\{1+\sqrt{2}, 1-\sqrt{2}\}$

[b] $\because n(x) = \frac{x(x^2+1)}{x^2+1} + \frac{x^2+2x+4}{(x-2)(x^2+2x+4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2\}$

$, n(x) = x + \frac{1}{x-2} = \frac{x(x-2)+1}{x-2}$

$= \frac{x^2-2x+1}{x-2} = \frac{(x-1)(x-1)}{x-2}$

3

[a] $\because 2x - y = 3$ (1)

$, x + 2y = 4 \quad \therefore x = 4 - 2y$ (2)

Substituting from (2) in (1) : $\therefore 2(4-2y) - y = 3$

$\therefore 8 - 4y - y = 3 \quad \therefore 8 - 5y = 3$

$\therefore -5y = -5 \quad \therefore y = 1$

Substituting in (2) : $\therefore x = 2$

$\therefore$ The S.S. $= \{(2, 1)\}$

[b] $\because n(x) = \frac{(x-5)(x+3)}{(x-3)(x+3)} \div \frac{-2(x-5)}{(x-3)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -3, 5\}$

$, n(x) = \frac{x-5}{x-3} \times \frac{(x-3)(x-3)}{-2(x-5)} = \frac{x-3}{-2}$

4

[a] $\because x + 2y = 2 \quad \therefore 2y = 2 - x$ (1)

$, x^2 + 2xy = 2$ (2)

Substituting from (1) in (2) :

$\therefore x^2 + x(2-x) = 2 \quad \therefore x^2 + 2x - x^2 = 2$

$\therefore 2x = 2 \quad \therefore x = 1$

Substituting in (1) : $\therefore y = \frac{1}{2}$

$\therefore$ The S.S. $= \{(1, \frac{1}{2})\}$

[b] $\because n_1(x) = 1 - \frac{1}{x}$

$\left.\begin{array}{l} \therefore \text{The domain of } n_1 = \mathbb{R} - \{0\} \\ , n_1(x) = \frac{x-1}{x} \end{array}\right\}$ (1)

$\left.\begin{array}{l} , \because n_2(x) = \frac{1-x}{x} \\ \therefore \text{The domain of } n_2 = \mathbb{R} - \{0\} \end{array}\right\}$ (2)

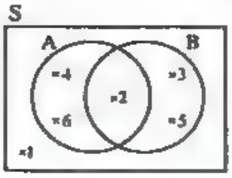
From (1) and (2) : $\therefore n_1 \neq n_2$

5

[a] $P(A) = \frac{3}{6} = \frac{1}{2}$

$P(B) = \frac{3}{6} = \frac{1}{2}$

$P(A \cup B) = \frac{5}{6}$



[b] $\because$ The domain of $n = \mathbb{R} - \{0, 4\}$

$\therefore 4 + m = 0 \quad \therefore m = -4$

$, \because n(5) = 2 \quad \therefore \frac{k}{5} + \frac{9}{5-4} = 2 \quad \therefore \frac{k}{5} + 9 = 2$

$\therefore \frac{k}{5} = -7 \quad \therefore k = -35$

6 El-Monofia

1

1 d 2 b 3 c 4 d 5 c 6 a

2

[a] $\because 2x - y = 3$ (1)

$, x + 2y = 4 \quad \therefore x = 4 - 2y$ (2)

Substituting from (2) in (1) : $\therefore 2(4-2y) - y = 3$

$\therefore 8 - 4y - y = 3 \quad \therefore 8 - 5y = 3$

$\therefore -5y = -5 \quad \therefore y = 1$

Substituting in (2) : $\therefore x = 2$

$\therefore$ The S.S. $= \{(2, 1)\}$

[b] $\because 3x^2 = 5x - 1 \quad \therefore 3x^2 - 5x + 1 = 0$

$\therefore a = 3, b = -5, c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore x = 1.43$ or $x = 0.23$

$\therefore$ The S.S. $= \{1.43, 0.23\}$

3

[a] $\because z(f) = \{3\} \quad \therefore$ At $x = 3$

$\therefore x^2 - ax + 9 = 0 \quad \therefore 3^2 - a \times 3 + 9 = 0$

$\therefore 9 - 3a + 9 = 0 \quad \therefore -3a = -18 \quad \therefore a = 6$

$, \because$ The domain of $f = \mathbb{R} - \{2\}$

$\therefore$ At $x = 2 \quad \therefore bx + 4 = 0$

$\therefore 2b + 4 = 0 \quad \therefore 2b = -4 \quad \therefore b = -2$

[b] $\because n(x) = \frac{(x-2)(x^2+2x+4)}{(x-2)(x-1)} \div \frac{x(x^2+2x+4)}{(2x+3)(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, 1, 0, -\frac{3}{2}\}$

$, n(x) = \frac{x^2+2x+4}{x-1} \times \frac{(2x+3)(x-1)}{x(x^2+2x+4)} = \frac{2x+3}{x}$

4

[a] $\because n(x) = \frac{x-3}{(x-3)(x-4)} - \frac{4}{x(x-4)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, 4, 0\}$

$, n(x) = \frac{1}{x-4} - \frac{4}{x(x-4)} = \frac{x-4}{x(x-4)} = \frac{1}{x}$

$, n(4)$ in undefined because $4 \notin$ the domain of n

[b] $\because x+y=4 \quad \therefore y=4-x$ (1)

, $\frac{1}{x}+\frac{1}{y}=1 \quad \therefore y+x=xy$ (2)

Substituting from (1) in (2) :

$\therefore 4-x+x=x(4-x) \quad \therefore 4=4x-x^2$

$\therefore x^2-4x+4=0 \quad \therefore (x-2)(x-2)=0$

$\therefore x=2$

Substituting in (1) : $\therefore y=2$

$\therefore$ The S.S. $=\{(2,2)\}$

5

[a] $\because n_1=\frac{(x+3)(x+2)}{(x+2)(x-1)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{-2,1\}$
, $n_1(x)=\frac{x+3}{x-1}$ (1)

, $\because n_2(x)=\frac{(x-5)(x+3)}{(x-5)(x-1)}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{5,1\}$
, $n_2(x)=\frac{x+3}{x-1}$ (2)

From (1) and (2) : $\therefore n_1 \neq n_2$

because the domain of $n_1 \neq$ the domain of n_2

[b] 1 $\because P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$\therefore P(A\cap B)=P(A)+P(B)-P(A\cup B)$

$=\frac{1}{4}+\frac{1}{2}-\frac{5}{8}=\frac{1}{8}$

2 $P(B-A)=P(B)-P(A\cap B)=\frac{1}{2}-\frac{1}{8}=\frac{3}{8}$

3 $P(A\cup B)'=1-P(A\cup B)=1-\frac{5}{8}=\frac{3}{8}$

7 El-Gharbia

1

1 c 2 d 3 b 4 d 5 c 6 d

2

[a] $\because P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$\therefore 0.8=0.5+x-0.1 \quad \therefore x=0.4$

, $\because P(A-B)=P(A)-P(A\cap B)=0.5-0.1=0.4$

[b] $\because n(x)=\frac{x(x-2)+x}{x-2}=\frac{x^2-2x+x}{x-2}$

$=\frac{x^2-x}{x-2}=\frac{x(x-1)}{x-2}$

$\therefore n^{-1}(x)=\frac{x-2}{x(x-1)}$

, the domain of $n^{-1}=\mathbb{R}-\{0,1,2\}$

3

[a] $\because n(x)=\frac{x}{x-2}-\frac{x}{x+2}$

$\therefore$ The domain of $n=\mathbb{R}-\{2,-2\}$

, $n(x)=\frac{x(x+2)-x(x-2)}{(x-2)(x+2)}$

$=\frac{x^2+2x-x^2+2x}{(x-2)(x+2)}=\frac{4x}{(x-2)(x+2)}$

[b] $\because x-y=3 \quad \therefore x=y+3$ (1)

, $y^2-xy=21$ (2)

Substituting from (1) in (2) : $\therefore y^2-(y+3)y=21$

$\therefore y^2-y^2+3y=21$

$\therefore 3y=21 \quad \therefore y=7$

Substituting in (1) : $\therefore x=10$

$\therefore$ The S.S. $=\{(10,7)\}$

4

[a] $\because x^2+2x-4=0$

$\therefore a=1, b=2, c=-4$

$\therefore x=\frac{-2\pm\sqrt{(2)^2-4\times1\times(-4)}}{2\times1}$

$=\frac{-2\pm\sqrt{20}}{2}=\frac{-2\pm2\sqrt{5}}{2}=-1\pm\sqrt{5}$

$\therefore x=-1+\sqrt{5}$ or $x=-1-\sqrt{5}$

The S.S. $=\{-1+\sqrt{5},-1-\sqrt{5}\}$

[b] $\because n_1(x)=\frac{(x-2)(x+2)}{(x+3)(x-2)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{-3,2\}$
, $n_1(x)=\frac{x+2}{x+3}$ (1)

, $\because n_2(x)=\frac{(x-3)(x+2)}{(x+3)(x-3)}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{-3,3\}$
, $n_2(x)=\frac{x+2}{x+3}$ (2)

From (1) and (2) : $\therefore n_1 \neq n_2$

because the domain of $n_1 \neq$ the domain of n_2

5

[a] $\because n(x)=\frac{(x-1)(x^2+x+1)}{x(x-1)}\div\frac{x^2+x+1}{x+3}$

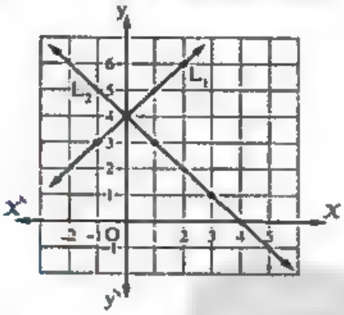
$\therefore$ The domain of $n=\mathbb{R}-\{0,1,-3\}$

, $n(x)=\frac{(x-1)(x^2+x+1)}{x(x-1)}\times\frac{x+3}{x^2+x+1}=\frac{x+3}{x}$

[b] $y = x + 4$, $x = 4 - y$

x	-1	0	2
y	3	4	6

x	3	1	0
y	1	3	4



From the graph : $\therefore$ The S.S. $= \{(0 , 4)\}$

8 El-Dakahlia

1

[a] 1 b 2 a 3 a

[b] $\because 3x - y = 5$ (1)

$, x + 2y = 4 \quad \therefore x = 4 - 2y$ (2)

Substituting from (2) in (1) : $\therefore 3(4 - 2y) - y = 5$

$\therefore 12 - 6y - y = 5 \qquad \therefore -7y = -7$

$\therefore y = 1$

Substituting in (2) : $\therefore x = 2$

$\therefore$ The S.S. $= \{(2 , 1)\}$

2

[a] 1 a 2 d 3 d

[b] $\because n(x) = \frac{x(x+1)}{(x-1)(x+1)} + \frac{x-5}{(x-1)(x-5)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , -1 , 5\}$

$, n(x) = \frac{x}{(x-1)} + \frac{1}{(x-1)} = \frac{x+1}{x-1}$

3

[a] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.6 + 0.5 - 0.3 = 0.8$

$\because P(\bar{B}) = 1 - P(B) \qquad \therefore P(\bar{B}) = 1 - 0.5 = 0.5$

[b] $\because n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)^2} \times \frac{2(x-1)}{x^2+x+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$ $, n(x) = 2$

4

[a] $\because n_1(x) = \frac{x(x-1)}{x^2(x-2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0 , 2\}$
$, n_1(x) = \frac{x-1}{x(x-2)}$ (1)

$, \because n_2(x) = \frac{(x-2)(x-1)}{x(x-2)(x-2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0 , 2\}$
$, n_2(x) = \frac{x-1}{x(x-2)}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

[b] $\because 2x^2 - 4x + 1 = 0$

$\therefore a = 2 , b = -4 , c = 1$

$\therefore x = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 2 \times 1}}{2 \times 2}$

$= \frac{4 \pm \sqrt{8}}{4} = \frac{4 \pm 2\sqrt{2}}{4} = \frac{2 \pm \sqrt{2}}{2}$

$\therefore x = 1.71$ or $x = 0.29$

The S.S. $= \{1.71 , 0.29\}$

5

[a] $\because x - y = 0 \qquad \therefore x = y$ (1)

$, x = \frac{4}{y}$ (2)

Substituting from (1) in (2) : $\therefore x = \frac{4}{x}$

$\therefore x^2 = 4 \qquad \therefore x = \pm\sqrt{4}$

$\therefore x = 2$ or $x = -2$

Substituting in (1) : $\therefore y = 2$ or $y = -2$

$\therefore$ The S.S. $= \{(2 , 2) , (-2 , -2)\}$

[b] 1 $\because n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$

, the domain of $n^{-1} = \mathbb{R} - \{0 , 2\}$

$, n^{-1}(x) = \frac{x^2+2}{x}$

2 $\because n^{-1}(x) = 3 \qquad \therefore \frac{x^2+2}{x} = 3$

$\therefore x^2 + 2 = 3x \quad \therefore x^2 - 3x + 2 = 0$

$\therefore (x-2)(x-1) = 0$

$\therefore x = 2$ (refused) or $x = 1$

9 Ismailia

1

1 c 2 b 3 d 4 a 5 c 6 c

2

[a] $\because 2x+y=1 \quad \therefore y=1-2x$ (1)

$, x+2y=5$ (2)

Substituting from (1) in (2) :

$\therefore x+2(1-2x)=5$

$\therefore x+2-4x=5 \qquad \therefore -3x=3$

$\therefore x=-1$

Substituting in (1) : $y=3$

$\therefore$ The S.S. $=\{(-1 , 3)\}$

[b] $\because n_1(x)=\frac{x^2-3x+9}{(x+3)(x^2-3x+9)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{-3\}$, $n_1(x)=\frac{1}{x+3}$ (1)

$, \because n_2(x)=\frac{2}{2(x+3)}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{-3\}$, $n_2(x)=\frac{1}{x+3}$ (2)

From (1) and (2) : $\therefore n_1=n_2$

3

[a] $\because 3x^2-6x+1=0$

$\therefore a=3 , b=-6 , c=1$

$\therefore x=\frac{6\pm\sqrt{(-6)^2-4\times3\times1}}{2\times3}=\frac{6\pm\sqrt{24}}{6}$

$=\frac{6\pm2\sqrt{6}}{6}=\frac{3\pm\sqrt{6}}{3}$

$\therefore x\approx1.82$ or $x\approx0.18$

The S.S. $=\{1.82 , 0.18\}$

[b] $\because$ The domain of $n=\mathbb{R}-\{3\}$

$\therefore$ At $x=3 \qquad \therefore x^2-ax+9=0$

$\therefore 9-3a+9=0 \qquad \therefore -3a=-18 \qquad \therefore a=6$

4

[a] Let the two numbers be x and y

$\therefore xy=10$ (1)

$, x-y=3 \qquad \therefore x=y+3$ (2)

Substituting from (2) in (1) : $\therefore (y+3)y=10$

$\therefore y^2+3y-10=0 \qquad \therefore (y-2)(y+5)=0$

$\therefore y=2$ or $y=-5$

Substituting in (2) : $x=5$ or $x=-2$

$\therefore$ The two numbers are : 5 , 2 or -2 , -5

[b] $\because n(x)=\frac{(x+5)(x-1)}{(x-2)(x^2+2x+4)}\div\frac{x+5}{x^2+2x+4}$

$\therefore$ The domain of $n=\mathbb{R}-\{2 , -5\}$

$, n(x)=\frac{(x+5)(x-1)}{(x-2)(x^2+2x+4)}\times\frac{x^2+2x+4}{x+5}$

$=\frac{x-1}{x-2}$

$, \because n(3)=\frac{3-1}{3-2}=2$

, n (2) is undefined because $2\notin$ the domain of n

5

[a] $\because n(x)=\frac{x(x-3)}{(x-3)(x+3)}+\frac{x-1}{(x+3)(x-1)}$

$\therefore$ The domain of $n=\mathbb{R}-\{3 , -3 , 1\}$

$, n(x)=\frac{x}{x+3}+\frac{1}{x+3}=\frac{x+1}{x+3}$

[b] 1 $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$=0.4+0.5-0.2=0.7$

2 $P(A-B)=P(A)-P(A\cap B)$

$=0.4-0.2=0.2$

10 Suez

1

1 c 2 b 3 a 4 c 5 b 6 c

2

[a] $\because x-y=3 \qquad \therefore x=y+3$ (1)

$, 2x+y=9$ (2)

Substituting from (1) in (2) : $\therefore 2(y+3)+y=9$

$\therefore 2y+6+y=9 \qquad \therefore 3y=3 \qquad \therefore y=1$

Substituting in (1) : $\therefore x=4$

$\therefore$ The S.S. $=\{(4 , 1)\}$

[b] $\because n(x)=\frac{x(x-2)}{(x-2)(x+2)}+\frac{2(x+3)}{(x+3)(x+2)}$

$\therefore$ The domain of $n=\mathbb{R}-\{2 , -2 , -3\}$

$, n(x)=\frac{x}{x+2}+\frac{2}{x+2}=\frac{x+2}{x+2}=1$

3

[a] $x - y = 0$ $\therefore x = y$ (1)

, $xy = 9$ (2)

Substituting from (1) in (2) : $\therefore x^2 = 9$

$\therefore x = \pm\sqrt{9}$

$\therefore x = 3$ or $x = -3$

Substituting in (1) : $\therefore y = 3$ or $y = -3$

$\therefore$ The S.S. $= \{(3, 3), (-3, -3)\}$

[b] $\because n(x) = \frac{(x+3)(x-1)}{x+3} \times \frac{x+1}{(x-1)(x+1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-3, 1, -1\}$

, $n(x) = 1$

4

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(\acute{A}) = 1 - P(A) = 1 - 0.3 = 0.7$

[b] $\because n(x) = \frac{(x-1)(x-1)}{(x-1)(x^2+x+1)} \div \frac{x-1}{x^2+x+1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

, $n(x) = \frac{x-1}{x^2+x+1} \times \frac{x^2+x+1}{x-1} = 1$

5

[a] $\because x^2 - 2x - 6 = 0$

$\therefore a = 1, b = -2, c = -6$

$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-6)}}{2 \times 1}$

$= \frac{2 \pm \sqrt{28}}{2} = \frac{2 \pm 2\sqrt{7}}{2} = 1 \pm \sqrt{7}$

$\therefore x \simeq 3.65$ or $x \simeq -1.65$

$\therefore$ The S.S. $= \{3.65, -1.65\}$

[b] $\because n_1(x) = \frac{2x}{2(x+2)}$

$\left.\begin{array}{l} \therefore \text{The domain of } n_1 = \mathbb{R} - \{-2\} \\ , n_1(x) = \frac{x}{x+2} \end{array}\right\}$ (1)

$\left.\begin{array}{l} , \because n_2(x) = \frac{x(x+2)}{(x+2)(x+2)} \\ \therefore \text{The domain of } n_2 = \mathbb{R} - \{-2\} \\ , n_2(x) = \frac{x}{x+2} \end{array}\right\}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

11 Port Said

1

1 b 2 c 3 b 4 d 5 d 6 a

2

[a] $\because$ The domain of $n = \mathbb{R} - \{3\}$

$\therefore (3)^2 - 3a + 9 = 0$ $\therefore 18 - 3a = 0$

$\therefore -3a = -18$ $\therefore a = 6$

[b] Let the length be x cm. and the width be y cm.

$\therefore 2(x + y) = 22$ $\therefore y = 11 - x$ (1)

, $xy = 24$ (2)

Substituting from (1) in (2) : $\therefore x(11 - x) = 24$

$\therefore 11x - x^2 - 24 = 0$ (Multiplying by -1)

$\therefore x^2 - 11x + 24 = 0$

$(x-3)(x-8) = 0$ $\therefore x = 3$ or $x = 8$

Substituting in (1) : $\therefore y = 8$ or $y = 3$

$\therefore$ The length = 8 cm. , the width = 3 cm.

3

[a] $\because x^2 - 2x - 1 = 0$

$\therefore a = 1, b = -2, c = -1$

$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-1)}}{2 \times 1} = \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2}$

$= 1 \pm \sqrt{2}$

$\therefore x \simeq 2.4$ or $x \simeq -0.4$

$\therefore$ The S.S. $= \{2.4, -0.4\}$

[b] $\because n(x) = \frac{x^2+x+1}{x} \div \frac{(x-1)(x^2+x+1)}{x(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{0, 1\}$

, $n(x) = \frac{x^2+x+1}{x} \times \frac{x}{x^2+x+1} = 1$

4

[a] $\because x + 3y = 7$ $\therefore x = 7 - 3y$ (1)

, $5x - y = 3$ (2)

Substituting from (1) in (2) : $\therefore 5(7 - 3y) - y = 3$

$\therefore 35 - 15y - y = 3$ $\therefore -16y = -32$ $\therefore y = 2$

Substituting in (1) : $\therefore x = 1$

$\therefore$ The S.S. $= \{(1, 2)\}$

[b] $\because n(x) = \frac{x(x+2)}{(x-2)(x+2)} + \frac{x-3}{(x-3)(x-2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2, 3\}$

, $n(x) = \frac{x}{x-2} + \frac{1}{x-2} = \frac{x+1}{x-2}$

5

[a] 1 The probability that the number on the card is a multiple of 5 $= \frac{5}{20} = \frac{1}{4}$

2 The probability that the number on the card is a multiple of 5 $= \frac{4}{20} = \frac{1}{5}$

3 The probability that the number on the card is a multiple of 4 or 5 $= \frac{8}{20} = \frac{2}{5}$

[b] $\because n_1(x) = \frac{x+3}{(x-3)(x+3)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{3, -3\}$

, $n_1(x) = \frac{1}{x-3}$

, $\because n_2(x) = \frac{2}{2(x-3)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{3\}$

, $n_2(x) = \frac{1}{x-3}$

$\therefore n_1(x) = n_2(x)$

for all the values of $x \in \mathbb{R} - \{3, -3\}$

12 Damietta

1

1 a	2 b	3 d	4 a	5 b	6 a

2

[a] $\because x + \frac{4}{x} = 6$

$\therefore x^2 + 4 = 6x \quad \therefore x^2 - 6x + 4 = 0$

$\therefore a = 1, b = -6, c = 4$

$\therefore x = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 1 \times 4}}{2 \times 1} = \frac{6 \pm \sqrt{20}}{2} = \frac{6 \pm 2\sqrt{5}}{2}$

$= 3 \pm \sqrt{5}$

$\therefore x = 5.2$ or $x = 0.8$

$\therefore$ The S.S. $= \{5.2, 0.8\}$

[b] $\because n(x) = \frac{2x}{x-3} + \frac{x(x+2)}{(x+3)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -3, 0, -2\}$

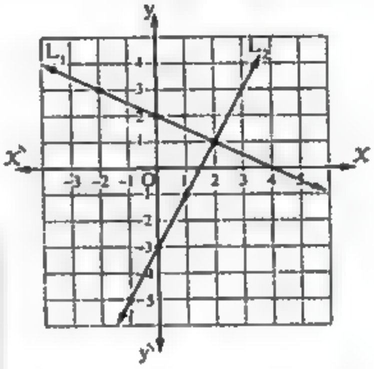
, $n(x) = \frac{2x}{x-3} \times \frac{(x+3)(x-3)}{x(x-2)} = \frac{2(x+3)}{x+2}$

3

[a] $x = 4 - 2y$ $\qquad y = 2x - 3$

x	-2	0	2
y	3	2	1

x	1	0	-1
y	-1	-3	-5



From the graph : $\therefore$ The S.S. $= \{(2, 1)\}$

[b] $\because n(x) = \frac{x^2 - 2x + 4}{(x+2)(x^2 - 2x + 4)} + \frac{(x-1)(x+1)}{(x+2)(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2, 1\}$

, $n(x) = \frac{1}{x+2} + \frac{x+1}{x+2} = \frac{x+2}{x+2} = 1$

4

[a] $\because n_1(x) = \frac{x(x+2)}{(x+2)(x+2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-2\}$, $n_1(x) = \frac{x}{x+2}$ $\quad$ (1)

, $\because n_2(x) = \frac{2x}{2(x+2)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-2\}$, $n_2(x) = \frac{x}{x+2}$ $\quad$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

[b] $\because x - y = 2 \qquad \therefore x = y + 2$ $\quad$ (1)

, $x^2 + y^2 = 20$ $\quad$ (2)

Substituting from (1) in (2) : $\therefore (y+2)^2 + y^2 = 20$

$\therefore y^2 + 4y + 4 + y^2 = 20$

$\therefore 2y^2 + 4y - 16 = 0$ (Dividing by 2)

$\therefore y^2 + 2y - 8 = 0 \qquad \therefore (y+4)(y-2) = 0$

$\therefore y = -4$ or $y = 2$

Substituting in (1) : $\therefore x = -2$ or $x = 4$

$\therefore$ The S.S. $= \{(-2, -4), (4, 2)\}$

5

[a] $\because$ The domain of $n = \mathbb{R} - \{5\}$

$\therefore (5)^2 - 5a + 25 = 0$

$\therefore -5a = -50 \qquad \therefore a = 10$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.8 + 0.7 - 0.6 = 0.9$

2 $P(\acute{A}) = 1 - P(A) = 1 - 0.8 = 0.2$

13 Kafr El-Sheikh

1

[a] 1 c 2 a 3 d

[b] $\because n(x) = \frac{(2x+3)(x-2)}{x(x-3)} \div \frac{(2x-3)(2x+3)}{x(2x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{0, 3, \frac{3}{2}, \frac{-3}{2}\}$

$, n(x) = \frac{(2x+3)(x-2)}{x(x-3)} \times \frac{x}{(2x+3)} = \frac{x-2}{x-3}$

2

[a] 1 c 2 d 3 c

[b] $\because n_1(x) = \frac{x}{x(x-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, 1\}$

$, n_1(x) = \frac{1}{x-1}$ (1)

$, n_2(x) = \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, -1\}$

$, n_2(x) = \frac{1}{x-1}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

3

[a] $\because 3x^2 + 1 = 5x$

$\therefore 3x^2 - 5x + 1 = 0$

$\therefore a = 3, b = -5, c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore x \approx 1.43$ or $x \approx 0.23$

$\therefore$ The S.S. $= \{1.43, 0.23\}$

[b] 1 $\because z(n_2) = \{-3\} \quad \therefore 6 - a(-3) = 0$

$\therefore 6 + 3a = 0 \qquad \therefore 3a = -6 \qquad \therefore a = -2$

2 $\because n(x) = n_1(x) - n_2(x)$

$\therefore n(x) = \frac{x^2 - 2x - 15}{x^2 - 9} - \frac{2x+6}{x^2 - 6x + 9}$

$= \frac{(x-5)(x+3)}{(x-3)(x+3)} - \frac{2(x+3)}{(x-3)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -3\}$

$, n(x) = \frac{x-5}{x-3} - \frac{2(x+3)}{(x-3)(x-3)}$

$= \frac{(x-5)(x-3) - 2(x+3)}{(x-3)(x-3)}$

$= \frac{x^2 - 8x + 15 - 2x - 6}{(x-3)(x-3)}$

$= \frac{x^2 - 10x + 9}{(x-3)(x-3)} = \frac{(x-1)(x-9)}{(x-3)(x-3)}$

4

[a] $\because 3x + 2y = 4$ (1)

$, x - 3y = 5 \qquad \therefore x = 3y + 5$ (2)

Substituting from (2) in (1) :

$\therefore 3(3y + 5) + 2y = 4$

$\therefore 9y + 15 + 2y = 4 \qquad \therefore 11y = -11 \qquad \therefore y = -1$

Substituting in (2) : $\therefore x = 2$

$\therefore$ The S.S. $= \{(2, -1)\}$

[b] $\because 2P(B) = P(\acute{B}) \qquad \therefore 2P(B) = 1 - P(B)$

$\therefore 3P(B) = 1 \qquad \therefore P(B) = \frac{1}{3}$

1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{1}{2} + \frac{1}{3} - \frac{1}{6} = \frac{2}{3}$

2 $\because A, B$ are mutually exclusive events

$\therefore P(A \cap B) = 0$

$\therefore P(A \cup B) = P(A) + P(B) = \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$

5

[a] $\because x - 2y - 1 = 0 \qquad \therefore x = 2y + 1$ (1)

$, x^2 - xy = 0$ (2)

Substituting from (1) in (2) :

$\therefore (2y+1)^2 - (2y+1)y = 0$

$\therefore 4y^2 + 4y + 1 - 2y^2 - y = 0$

$\therefore 2y^2 + 3y + 1 = 0$

$\therefore (2y+1)(y+1) = 0 \qquad \therefore y = -\frac{1}{2}$ or $y = -1$

Substituting in (1) : $\therefore x = 0$ or $x = -1$

$\therefore$ The S.S. $= \{(0, -\frac{1}{2}), (-1, -1)\}$

[b] $\because n(x)=\frac{x(x-3)}{(x-3)(x^2+2)}$

$\therefore n^{-1}(x)=\frac{(x-3)(x^2+2)}{x(x-3)}$

$\therefore$ The domain of $n^{-1}=\mathbb{R}-\{0,3\}$

, $n^{-1}(x)=\frac{x^2+2}{x}$

14 El-Beheira

1

1 b 2 a 3 c 4 a 5 c 6 c

2

[a] $\because y-x=2$ $\therefore y=x+2$ (1)

, $x^2+xy-4=0$ (2)

Substituting from (1) in (2) :

$\therefore x^2+x(x+2)-4=0$

$\therefore x^2+x^2+2x-4=0$

$\therefore 2x^2+2x-4=0$ (Dividing by 2)

$\therefore x^2+x-2=0$

$(x-1)(x+2)=0$

$\therefore x=1$ or $x=-2$

Substituting in (1) : $\therefore y=3$ or $y=0$

$\therefore$ The S.S $=\{(1,3),(-2,0)\}$

[b] $\because n(x)=\frac{(x-1)(x^2+x+1)}{(x-1)(x-1)}\times\frac{2(x-1)}{x^2+x+1}$

$\therefore$ The domain of $n=\mathbb{R}-\{1\}$, $n(x)=2$

3

[a] Let the measure of the first angle be $x°$

, the measure of the second angle be $y°$

$\therefore x+y=90°$ (1)

, $x-y=50°$ (2)

Adding (1) and (2) : $\therefore 2x=140°$ $\therefore x=70°$

Substituting in (1) : $\therefore y=20°$

$\therefore$ The measures of the two angles are 70° , 20°

[b] 1 $\because n(x)=\frac{x(x-2)}{(x-2)(x^2+2)}$

$\therefore n^{-1}(x)=\frac{(x-2)(x^2+2)}{x(x-2)}$

$\therefore$ The domain of $n^{-1}=\mathbb{R}-\{0,2\}$

, $n^{-1}(x)=\frac{x^2+2}{x}$

2 $\because n^{-1}(x)=3$ $\therefore \frac{x^2+2}{x}=3$

$\therefore x^2-3x+2=0$ $\therefore (x-2)(x-1)=0$

$\therefore x=2$ (refused) or $x=1$

4

[a] $\because 3x^2=5x-1$ $\therefore 3x^2-5x+1=0$

$\therefore a=3, b=-5, c=1$

$\therefore x=\frac{5\pm\sqrt{(-5)^2-4\times3\times1}}{2\times3}=\frac{5\pm\sqrt{13}}{6}$

$\therefore x\approx 1.43$ or $x\approx 0.23$

$\therefore$ The S.S. $=\{1.43, 0.23\}$

[b] $\because n_1(x)=\frac{2x}{2(x+2)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_1=\mathbb{R}-\{-2\}\\ , n_1(x)=\frac{x}{x+2}\end{array}\right\}$ (1)

, $\because n_2(x)=\frac{x(x+2)}{(x+2)(x+2)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_2=\mathbb{R}-\{-2\}\\ , \because n_2(x)=\frac{x}{x+2}\end{array}\right\}$ (2)

From (1) and (2) : $\therefore n_1=n_2$

5

[a] $\because n(x)=\frac{x-3}{(x-3)(x-4)}-\frac{4}{x(x-4)}$

$\therefore$ The domain of $n=\mathbb{R}-\{3,4,0\}$

$\therefore n(x)=\frac{1}{x-4}-\frac{4}{x(x-4)}=\frac{x-4}{x(x-4)}=\frac{1}{x}$

[b] 1 $P(\acute{A})=1-P(A)=1-0.8=0.2$

2 $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$=0.8+0.7-0.6=0.9$

15 El-Fayoum

1

1 b 2 b 3 d 4 b 5 a 6 c

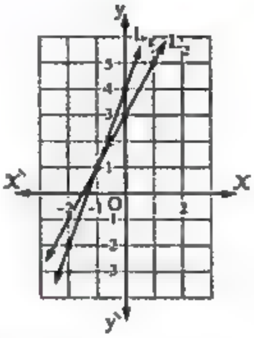
2

[a] $y=3x+4$

x	-2	-1	0
y	-2	1	4

$y=2x+3$

x	-1	0	1
y	1	3	5



From the graph :

$\therefore$ The S.S. $=\{(-1 , 1)\}$

[b] $\because n(x)=\frac{x(x-1)}{(x+1)(x-1)}+\frac{x-5}{(x-5)(x-1)}$

$\therefore$ The domain of $n=\mathbb{R}-\{-1 , 1 , 5\}$

$, n(x)=\frac{x}{x+1}+\frac{1}{x-1}=\frac{x(x-1)+x+1}{(x+1)(x-1)}$

$=\frac{x^2-x+x+1}{(x+1)(x-1)}$

$=\frac{x^2+1}{(x+1)(x-1)}$

3

[a] $\because x^2+3x+5=0$

$\therefore a=1 , b=3 , c=5$

$\therefore x=\frac{-3\pm\sqrt{(3)^2-4\times1\times5}}{2\times1}=\frac{-3\pm\sqrt{-11}}{2}$

The S.S. $=\varnothing$

[b] $\because n(x)=\frac{(x-7)(x+7)}{(x-2)(x^2+2x+4)}\div\frac{x+7}{x-2}$

$\therefore$ The domain of $n=\mathbb{R}-\{2 , -7\}$

$, n(x)=\frac{(x-7)(x+7)}{(x-2)(x^2+2x+4)}\times\frac{x-2}{x+7}$

$=\frac{x-7}{x^2+2x+4}$

$\therefore n(1)=\frac{1-7}{1+2+4}=\frac{-6}{7}$

4

[a] $\because n_1(x)=\frac{(x-2)(x+2)}{(x+3)(x-2)}$

$\therefore$ The domain of $n_1=\mathbb{R}-\{-3 , 2\}$

$, n_1(x)=\frac{x+2}{x+3}$

$, \because n_2(x)=\frac{x(x^2-x-6)}{x(x^2-9)}=\frac{x(x-3)(x+2)}{x(x-3)(x+3)}$

$\therefore$ The domain of $n_2=\mathbb{R}-\{0 , 3 , -3\}$

$, n_2(x)=\frac{x+2}{x+3}$

$\therefore n_1\neq n_2$

Because the domain of $n_1\neq$ the domain of n_2

[b] Let x and y be two real numbers

$\because x+y=9$ $\therefore y=9-x$ (1)

$, x^2-y^2=45$ (2)

Substituting from (1) in (2) : $\therefore x^2-(9-x)^2=45$

$\therefore x^2-(81-18x+x^2)=45$

$\therefore x^2-81+18x-x^2=45$

$\therefore 18x=126$ $\therefore x=7$

Substituting in (1) : $\therefore y=2$

$\therefore$ The two real numbers are : 7 , 2

5

[a] $\because Z(f)=\{3 , 5\}$

$\therefore$ At $x=3$ $\therefore a\times3^2+3\times b+15=0$

$\therefore 9a+3b+15=0$ $\therefore 3a+b+5=0$ (1)

At $x=5$

$\therefore a\times5^2+b\times5+15=0$

$\therefore 25a+5b+15=0$

$\therefore 5a+b+3=0$ (2)

Subtracting (1) from (2) :

$\therefore 2a-2=0$ $\therefore a=1$

Substituting in (1) : $\therefore 3\times1+b+5=0$

$\therefore 3+b=-5$ $\therefore b=-8$

[b] $\because P(A)=P(\acute{A})$ $\therefore P(A)=1-P(A)$

$\therefore 2P(A)=1$ $\therefore P(A)=\frac{1}{2}$

1 $\because P(B)=\frac{5}{8}P(A)$

$\therefore P(B)=\frac{5}{8}\times\frac{1}{2}=\frac{5}{16}$

2 $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$=\frac{1}{2}+\frac{5}{16}-\frac{1}{16}=\frac{3}{4}$

16 Beni Suef

1

1 b	2 c	3 d	4 a	5 d	6 c

2

[a] $\because x^2-2x-2=0$

$\therefore a=1 , b=-2 , c=-2$

$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-2)}}{2 \times 1} = \frac{2 \pm \sqrt{12}}{2} = \frac{2 \pm 2\sqrt{3}}{2}$
$= 1 \pm \sqrt{3}$

$\therefore$ The S.S. $= \{1 + \sqrt{3} , 1 - \sqrt{3}\}$

[b] $\because n_1(x) = \frac{5x}{5(x+5)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-5\}$
$, n_1(x) = \frac{x}{x+5}$ (1)

$, \because n_2(x) = \frac{x(x+5)}{(x+5)^2}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{-5\}$
$, n_2(x) = \frac{x}{x+5}$ (2)

From (1) , (2) : $\therefore n_1 = n_2$

3

[a] $\because x + y = 7 \quad \therefore y = 7 - x$ (1)

$, x^2 + y^2 = 25$ (2)

Substituting from (1) in (2) :

$\therefore x^2 + (7 - x)^2 = 25$

$\therefore x^2 + 49 - 14x + x^2 - 25 = 0$

$\therefore 2x^2 - 14x + 24 = 0$ (Dividing by 2)

$\therefore x^2 - 7x + 12 = 0 \qquad \therefore (x-3)(x-4) = 0$

$\therefore x = 3$ or $x = 4$

Substituting in (1) : $\therefore y = 4$ or $y = 3$

$\therefore$ The S.S. $= \{(3 , 4) , (4 , 3)\}$

[b] $\because n(x) = \frac{x^2}{x(x-3)} \div \frac{3x}{(x+3)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{0 , 3 , -3\}$

$, n(x) = \frac{x}{x-3} \times \frac{(x+3)(x-3)}{3x} = \frac{x+3}{3}$

4

[a] $P(\acute{A}) = 1 - P(A) = 1 - 0.7 = 0.3$

$P(A - B) = P(A) - P(A \cap B)$
$= 0.7 - 0.3 = 0.4$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$
$= 0.7 + 0.5 - 0.3 = 0.9$

[b] $\because Z(f) = \{5\} \qquad \therefore$ At $x = 5$

$\therefore x^2 - 10x + a = 0 \qquad \therefore (5)^2 - 10 \times 5 + a = 0$

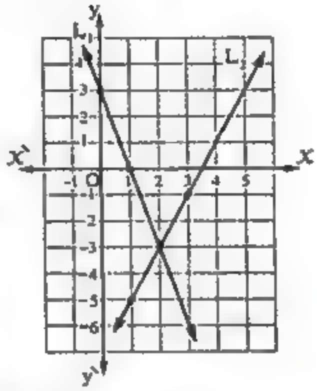
$\therefore 25 - 50 + a = 0 \qquad \therefore a = 25$

5

[a] $y = 3 - 3x \quad , \quad y = 2x - 7$

x	0	1	2
y	3	0	-3

x	1	2	3
y	-5	-3	-1



From the graph :

$\therefore$ The S.S. $= \{(2 , -3)\}$

[b] $\because n(x) = \frac{x^2 + x + 1}{(x-1)(x^2 + x + 1)} + \frac{(x-2)(x+1)}{(x-1)(x+1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1 , -1\}$

$, n(x) = \frac{1}{x-1} + \frac{x-2}{x-1} = \frac{x-1}{x-1} = 1$

17 El-Menia

1

1 a 2 c 3 d 4 a 5 b 6 a

2

[a] $\because 3x^2 - 5x + 1 = 0$

$\therefore a = 3 , b = -5 , c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore x \approx 1.4$ or $x \approx 0.2$

$\therefore$ The S.S. $= \{1.4 , 0.2\}$

[b] $\because n(x) = \frac{(x-2)(x^2 + 2x + 4)}{(x-3)(x-2)} \div \frac{x^2 + 2x + 4}{x-3}$

$\therefore$ The domain of $n = \mathbb{R} - \{3 , 2\}$

$, n(x) = \frac{(x-2)(x^2 + 2x + 4)}{(x-3)(x-2)} \times \frac{x-3}{x^2 + 2x + 4} = 1$

3

[a] $\because 2x + y = 1$ (1)

$, x + 2y = 5 \qquad \therefore x = 5 - 2y$ (2)

Substituting from (2) in (1) : $\therefore 2(5 - 2y) + y = 1$

$\therefore 10 - 4y + y = 1$ $\quad\therefore -3y = -9$

$\therefore y = 3$

Substituting in (2) : $\therefore x = -1$

$\therefore$ The S.S. $= \{(-1 , 3)\}$

[b] $\because n(x) = \frac{(x-5)(x+3)}{(x-3)(x+3)} - \frac{2(5-x)}{(x-5)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{3 , -3 , 5\}$

$, n(x) = \frac{x-5}{x-3} + \frac{2(x-5)}{(x-5)(x-3)} = \frac{x-5}{x-3} + \frac{2}{x-3}$

$= \frac{x-3}{x-3} = 1$

4

[a] $\because x + y = 2$ (1)

$, \frac{1}{x} + \frac{1}{y} = 2$ $\quad\therefore x + y = 2xy$ (2)

Substituting in (1) from (2) : $\therefore 2 = 2xy$

$\therefore xy = 1$ $\quad\therefore x = \frac{1}{y}$

Substituting in (1) : $\frac{1}{y} + y = 2$

Multiplying by y : $\therefore 1 + y^2 = 2y$

$\therefore y^2 - 2y + 1 = 0$ $\quad\therefore (y-1)^2 = 0$

$\therefore y = 1$

Substituting in (1) : $\therefore x = 1$

$\therefore$ The S.S. $= \{(1 , 1)\}$

[b] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_1 = \mathbb{R} - \{0 , 1\} \\ \therefore n_1(x) = \frac{1}{x-1}\end{array}\right\}$ (1)

$, \because n_2(x) = \frac{x(x^2+x+1)}{x(x^3-1)}$

$= \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_2 = \mathbb{R} - \{0 , 1\} \\ , n_2(x) = \frac{1}{x-1}\end{array}\right\}$ (2)

From (1) and (2) : $\therefore n_1 = n_2$

5

[a] $\because n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0 , 2\}$

$, n^{-1}(x) = \frac{x^2+2}{x}$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B)$

$= 0.3 - 0.2 = 0.1$

18 Assiut

1

1 b	2 c	3 d	4 c	5 d	6 a

2

[a] $\because 3x - y + 4 = 0$ (1)

$, y = 2x + 3$ (2)

Substituting from (2) in (1) :

$\therefore 3x - (2x + 3) + 4 = 0$

$\therefore 3x - 2x - 3 + 4 = 0$ $\quad\therefore x = -1$

Substituting in (2) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(-1 , 1)\}$

[b] $\because n(x) = \frac{(x-7)(x+7)}{(x-2)(x^2+2x+4)} \div \frac{x+7}{x-2}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , -7\}$

$, n(x) = \frac{(x-7)(x+7)}{(x-2)(x^2+2x+4)} \times \frac{x-2}{x+7}$

$= \frac{x-7}{x^2+2x+4}$

$\therefore n(1) = \frac{1-7}{1+2+4} = -\frac{6}{7}$

3

[a] $\because x(x-1) = 5$ $\quad\therefore x^2 - x - 5 = 0$

$\therefore a = 1 , b = -1 , c = -5$

$\therefore x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times (-5)}}{2 \times 1} = \frac{1 \pm \sqrt{21}}{2}$

$\therefore x \approx 2.8$ or $x \approx -1.8$

$\therefore$ The S.S. $= \{2.8 , -1.8\}$

[b] $\because n_1(x) = \frac{(x-2)(x+2)}{(x+3)(x-2)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{-3 , 2\}$ $, n_1(x) = \frac{x+2}{x+3}$

$, \because n_2(x) = \frac{x(x^2-x-6)}{x(x^2-9)} = \frac{x(x-3)(x+2)}{x(x-3)(x+3)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0 , 3 , -3\}$

$, n_2(x) = \frac{x+2}{x+3}$

$\therefore n_1(x) = n_2(x)$ for all values of $x \in \mathbb{R} - \{0 , 3 , -3 , 2\}$

4

[a] $\because x - y = 2 \qquad \therefore x = y + 2 \qquad (1)$

$, x^2 + y^2 = 20 \qquad (2)$

Substituting from (1) in (2) :

$\therefore (y+2)^2 + y^2 = 20$

$\therefore y^2 + 4y + 4 + y^2 - 20 = 0$

$\therefore 2y^2 + 4y - 16 = 0$ (Dividing by 2)

$\therefore y^2 + 2y - 8 = 0$

$\therefore (y+4)(y-2) = 0$

$\therefore y = -4$ or $y = 2$

Substituting in (1) :

$\therefore x = -2$ or $x = 4$

$\therefore$ The S.S. $= \{(-2 , -4) , (4 , 2)\}$

[b] $\because Z(f) = \{5\}$

$\therefore (5)^3 - 3(5)^2 + a = 0 \qquad \therefore 125 - 75 + a = 0$

$50 + a = 0 \qquad \therefore a = -50$

5

[a] $\because n(x) = \frac{x-3}{(x-4)(x-3)} + \frac{x-3}{x-3}$

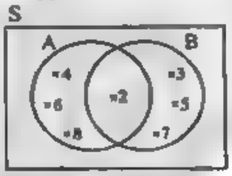
$\therefore$ The domain of $n = \mathbb{R} - \{4 , 3\}$

$, n(x) = \frac{1}{x-4} + 1 = \frac{1 + x - 4}{x-4} = \frac{x-3}{x-4}$

[b] 1 $P(A) = \frac{4}{7}$

$, P(\bar{B}) = 1 - P(B)$

$= 1 - \frac{4}{7} = \frac{3}{7}$



2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{4}{7} + \frac{4}{7} - \frac{1}{7} = 1$

19 Souhag

1

1 d	2 c	3 b	4 a	5 d	6 c

2

[a] $\because x(x-1) = 4 \qquad \therefore x^2 - x - 4 = 0$

$\therefore a = 1 , b = -1 , c = -4$

$\therefore x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{1 \pm \sqrt{17}}{2}$

$x \approx 2.6$ or $x \approx -1.6$

$\therefore$ The S.S. $= \{2.6 , -1.6\}$

[b] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0 , 1\}$

$, n_1(x) = \frac{1}{x-1}$ $\Big\}$ (1)

$, \because n_2(x) = \frac{x(x^2+x+1)}{x(x^3-1)}$

$= \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0 , 1\}$

$, n_2(x) = \frac{1}{x-1}$ $\Big\}$ (2)

from (1) and (2) : $\therefore n_1 = n_2$

3

[a] $\because x - y = 0 \qquad \therefore x = y \qquad (1)$

$, x^2 + xy + y^2 = 27 \qquad (2)$

Substituting from (1) in (2) :

$\therefore y^2 + y^2 + y^2 = 27 \qquad \therefore 3y^2 = 27$

$\therefore y^2 = 9 \qquad \therefore y = 3$ or $y = -3$

Substituting in (1) : $\therefore x = 3$ or $x = -3$

$\therefore$ The S.S. $= \{(3 , 3) , (-3 , -3)\}$

[b] $\because n(x) = \frac{x(x-2)}{(x-2)(x-1)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x-1)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0 , 2 , 1\}$

$, n^{-1}(x) = \frac{x-1}{x}$

4

[a] $\because 2x - y = 5 \qquad (1)$

$, x + y = 4 \qquad (2)$

Adding (1) and (2) : $\therefore 3x = 9 \quad \therefore x = 3$

Substituting in (2) : $\therefore y = 1$

[b] $\because n(x) = \frac{x(x+2)}{(x+2)(x-2)} - \frac{2(x-3)}{(x-3)(x-2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2 , 2 , 3\}$

$\therefore n(x) = \frac{x}{x-2} - \frac{2}{x-2} = \frac{x-2}{x-2} = 1$

5

[a] $\because n(x) = \frac{(x-2)(x^2+2x+4)}{(x-2)(x+3)} \times \frac{x+3}{x^2+2x+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2 , -3\}$, $n(x) = 1$

[b] $P(\acute{A}) = 1 - P(A) = 1 - 0.3 = 0.7$

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

20 Qena

1

1 d   2 c   3 a   4 b   5 c   6 a

2

[a] $\because X - 2 = 0 \quad \therefore X = 2$ (1)

$, y^2 - 3Xy + 5 = 0$ (2)

Substituting from (1) in (2) : $\therefore y^2 - 6y - 5 = 0$

$\therefore (y-5)(y-1) = 0$

$\therefore y = 5$ or $y = 1$

$\therefore$ The S.S. $= \{(2, 5), (2, 1)\}$

[b] $\because n(X) = \frac{5}{X-3} - \frac{4}{X-3}$

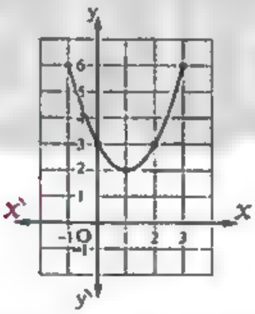
$\therefore$ The domain of $n = \mathbb{R} - \{3\}$

$, n(X) = \frac{5-4}{X-3} = \frac{1}{X-3}$

3

[a] $f(X) = X^2 - 2X + 3$

X	-1	0	1	2	3
y	6	3	2	3	6



From the graph : $\therefore$ The S.S. $= \varnothing$

[b] $\because n(X) = \frac{(X+4)(X-3)}{(X+4)(X+1)}$

$\therefore n^{-1}(X) = \frac{(X+4)(X+1)}{(X+4)(X-3)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{-4, 3, -1\}$

$, n^{-1}(X) = \frac{X+1}{X-3} \quad \therefore n^{-1}(0) = \frac{0+1}{0-3} = -\frac{1}{3}$

4

[a] $\because 2X^2 - 5X + 1 = 0$

$\therefore a = 2, b = -5, c = 1$

$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore X \approx 2.28$ or $X \approx 0.22$

$\therefore$ The S.S. $= \{2.28, 0.22\}$

[b] $\because n_1(X) = \frac{(X+1)(X^2 - X + 1)}{X(X^2 - X + 1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_1 = \mathbb{R} - \{0\} \\ , n_1(X) = \frac{X+1}{X}\end{array}\right\}$ (1)

$, \because n_2(X) = \frac{X^2(X+1) + X + 1}{X(X^2+1)} = \frac{(X+1)(X^2+1)}{X(X^2+1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_2 = \mathbb{R} - \{0\} \\ , n_2(X) = \frac{X+1}{X}\end{array}\right\}$ (2)

from (1) and (2) : $\therefore n_1 = n_2$

5

[a] 1 $P(\acute{A}) = 1 - P(A) = 1 - 0.8 = 0.2$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.8 + 0.7 - 0.6 = 0.9$

3 $P(A - B) = P(A) - P(A \cap B)$

$= 0.8 - 0.6 = 0.2$

[b] $\because n(X) = \frac{X(X+2)}{(X-3)(X^2+3X+9)} \div \frac{X+2}{X^2+3X+9}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -2\}$

$\therefore n(X) = \frac{X(X+2)}{(X-3)(X^2+3X+9)} \times \frac{X^2+3X+9}{X+2}$

$= \frac{X}{X-3}$

21 Luxor

1

1 d   2 b   3 c   4 b   5 d   6 a

2

[a] Let $n_1(X) = \frac{X-4}{X^2 - 5X + 6}$

$\therefore n_1(X) = \frac{X-4}{(X-2)(X-3)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{2, 3\}$

$,$ let $n_2(X) = \frac{2X}{X^3 - 9X}$

$\therefore n_2(X) = \frac{2X}{X(X^2-9)} = \frac{2X}{X(X-3)(X+3)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, 3, -3\}$

$\therefore$ The common domain $= \mathbb{R} - \{2, 3, 0, -3\}$

[b] $\because y + 2x = 7 \quad \therefore y = 7 - 2x \quad (1)$

$, 2x^2 + x + 3y = 19 \quad (2)$

Substituting from (1) in (2) :

$\therefore 2x^2 + x + 3(7 - 2x) = 19$

$\therefore 2x^2 + x + 21 - 6x = 19$

$\therefore 2x^2 - 5x + 2 = 0 \quad \therefore (2x - 1)(x - 2) = 0$

$\therefore x = \frac{1}{2}$ or $x = 2$

Substituting (1) : $\therefore y = 6$ or $y = 3$

$\therefore$ The S.S. $= \left\{\left(\frac{1}{2}, 6\right), (2, 3)\right\}$

3

[a] $\because n(x) = \frac{x-3}{(x-3)(x-4)} + \frac{x-3}{x-3}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, 4\}$

$, n(x) = \frac{1}{x-4} + 1 = \frac{1}{x-4} + \frac{x-4}{x-4} = \frac{x-3}{x-4}$

[b] 1 The probability of the student succeeded in Math $= \frac{30}{40} = \frac{3}{4}$

2 The probability of the student succeeded in Science only $= \frac{4}{40} = \frac{1}{10}$

3 The probability of the succeeded in one of them at least $= \frac{34}{40} = \frac{17}{20}$

4

[a] $\because 2x^2 - x - 2 = 0$

$\therefore a = 2, b = -1, c = -2$

$\therefore x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 2 \times (-2)}}{2 \times 2}$

$= \frac{1 \pm \sqrt{17}}{4} = \frac{1 \pm 4.12}{4}$

$\therefore x \approx 1.28$ or $x \approx -0.78$

$\therefore$ The S.S. $= \{1.28, -0.78\}$

[b] $\because n_1(x) = \frac{x}{(x-1)(x+1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{1, -1\}$

$, n_1(x) = \frac{x}{(x-1)(x+1)}$ (1)

$, \because n_2(x) = \frac{5x}{5(x^2-1)} = \frac{5x}{5(x-1)(x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{1, -1\}$

$, n_2(x) = \frac{x}{(x-1)(x+1)}$ (2)

from (1) and (2) : $\therefore n_1 = n_2$

5

[a] $\because n(x) = \frac{x(x-3)}{(2x+3)(x-2)} \div \frac{x(2x-3)}{(2x-3)(2x+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \left\{-\frac{3}{2}, 2, 0, \frac{3}{2}\right\}$

$, n(x) = \frac{x(x-3)}{(2x+3)(x-2)} \times \frac{(2x-3)(2x+3)}{x(2x-3)}$

$= \frac{x-3}{x-2}$

[b] $\because x + 2y = 8 \quad (1)$

$, 3x + y = 9$ (multiplying by -2)

$\therefore -6x - 2y = -18 \quad (2)$

Adding (1) and (2) : $-5x = -10$

$\therefore x = 2$

Substituting in (1) : $\therefore y = 3$

$\therefore$ The S.S. $= \{(2, 3)\}$

22 Aswan

1

1 c 2 b 3 d 4 c 5 d 6 c

2

[a] $\because 3x - y = -4 \quad (1)$

$, y - 2x = 3 \quad \therefore y = 3 + 2x \quad (2)$

Substituting from (2) in (1) :

$\therefore 3x - (3 + 2x) = -4$

$\therefore 3x - 3 - 2x = -4$

$\therefore x = -1$

Substituting in (2) : $\therefore y = 1$

$\therefore$ The S.S. $= \{(-1, 1)\}$

[b] $\because n(x) = \frac{(x+1)(x+3)}{(x-3)(x^2+3x+9)} \div \frac{x+3}{x^2+3x+9}$

$\therefore$ The domain of $n = \mathbb{R} - \{3, -3\}$

$, n(x) = \frac{(x+1)(x+3)}{(x-3)(x^2+3x+9)} \times \frac{x^2+3x+9}{x+3}$

$= \frac{x+1}{x-3}$

3

[a] $\because x - y = 1 \quad \therefore x = y + 1 \quad (1)$

$, x^2 + y^2 = 25 \quad (2)$

Substituting from (1) in (2) : $\therefore (y+1)^2 + y^2 = 25$

$\therefore y^2 + 2y + 1 + y^2 - 25 = 0$

$\therefore 2y^2 + 2y - 24 = 0$ (Dividing by 2)

$\therefore y^2 + y - 12 = 0 \qquad \therefore (y-3)(y+4) = 0$

$\therefore y = 3$ or $y = 4$

Substituting in (1) : $\therefore x = 4$ or $x = 5$

$\therefore$ The S.S. $= \{(4, 3), (5, 4)\}$

[b] $\because n(x) = \frac{x(x-2)}{(x-2)(x-1)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x-1)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 2, 1\}$

, $n^{-1}(x) = \frac{x-1}{x}$

4

[a] $\because 2x^2 - 5x + 1 = 0$

$\therefore a = 2, b = -5, c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore$ The S.S. $= \left\{\frac{5+\sqrt{17}}{4}, \frac{5-\sqrt{17}}{4}\right\}$

[b] $\because n(x) = \frac{x(x+2)}{(x+2)(x-2)} - \frac{2(x-3)}{(x-2)(x-3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2, 2, 3\}$

, $n(x) = \frac{x}{x-2} - \frac{2}{x-2} = \frac{x-2}{x-2} = 1$

5

[a] $\because n_1(x) = \frac{2x}{2(x+4)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_1 = \mathbb{R} - \{-4\} \\ , n_1(x) = \frac{x}{x+4}\end{array}\right\}$ (1)

, $\because n_2(x) = \frac{x(x+4)}{(x+4)(x+4)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_2 = \mathbb{R} - \{-4\} \\ , n_2(x) = \frac{x}{x+4}\end{array}\right\}$ (2)

from (1) and (2) : $\therefore n_1 = n_2$

[b] $\because$ A , B are two mutually exclusive events

$\therefore P(A \cup B) = P(A) + P(B)$

$\therefore \frac{7}{12} = \frac{1}{3} + P(B)$

$\therefore P(B) = \frac{7}{12} - \frac{1}{3} = \frac{7-4}{12} = \frac{3}{12} = \frac{1}{4}$

23 New Valley

1

1 b   2 a   3 a   4 d   5 c   6 d

2

[a] $\because n(x) = \frac{(x-2)(x+2)}{(x+2)(x+3)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2, -3\}$

, $n(x) = \frac{x-2}{x+3}$

[b] $\because x^2 + y^2 = 17$ (1)

, $y - x = 3 \qquad \therefore y = x + 3$ (2)

Substituting from (2) in (1) : $\therefore x^2 + (x+3)^2 = 17$

$\therefore x^2 + x^2 + 6x + 9 = 17$

$\therefore 2x^2 + 6x - 8 = 0$ (Dividing by 2)

$\therefore x^2 + 3x - 4 = 0 \qquad \therefore (x+4)(x-1) = 0$

$\therefore x = -4$ or $x = 1$

Substituting in (2) : $\therefore y = -1$ or $y = 4$

$\therefore$ The S.S. $= \{(-4, -1), (1, 4)\}$

3

[a] $\because 3x - 2y = 4$ (1)

, $x + 3y = 5 \qquad \therefore x = 5 - 3y$ (2)

Substituting from (2) in (1) : $\therefore 3(5 - 3y) - 2y = 4$

$\therefore 15 - 9y - 2y = 4 \qquad \therefore -11y = -11 \qquad \therefore y = 1$

Substituting in (2) : $x = 2$

$\therefore$ The S.S. $= \{(2, 1)\}$

[b] $\because n(x) = \frac{x}{x+2} \div \frac{2x^2 - 4x}{x^2 - 4}$

$= \frac{x}{x+2} \div \frac{2x(x-2)}{(x-2)(x+2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2, 0\}$

, $n(x) = \frac{x}{x+2} \times \frac{(x-2)(x+2)}{2x(x-2)} = \frac{1}{2}$

4

[a] $\because n_1(x) = \frac{(x-1)(x^2+x+1)}{x(x^2+x+1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_1 = \mathbb{R} - \{0\} \\ , n_1(x) = \frac{x-1}{x}\end{array}\right\}$ (1)

, $n_2(x) = \frac{x^2(x-1) + (x-1)}{x(x^2+1)} = \frac{(x-1)(x^2+1)}{x(x^2+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0\}$

$, n_2(x) = \dfrac{x-1}{x}$ } (2)

from (1) and (2) : $\therefore n_1 = n_2$

[b] $\because n(x) = \dfrac{3x}{x(x-3)} - \dfrac{x}{x-3}$

$\therefore$ The domain of $n = \mathbb{R} - \{0, 3\}$

$, n(x) = \dfrac{3}{x-3} - \dfrac{x}{x-3} = \dfrac{3-x}{x-3} = \dfrac{-(x-3)}{(x-3)} = -1$

5

[a] 1 $P(\acute{A}) = 1 - P(A) = 1 - \frac{1}{5} = \frac{4}{5}$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

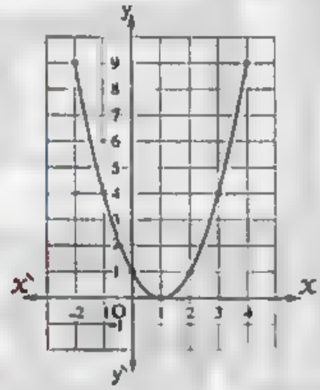
$= \frac{1}{5} + \frac{3}{5} - \frac{1}{10} = \frac{7}{10}$

3 $P(B - A) = P(B) - P(A \cap B)$

$= \frac{3}{5} - \frac{1}{10} = \frac{5}{10} = \frac{1}{2}$

[b] $f(x) = x^2 - 2x + 1$

x	-2	-1	0	1	2	3	4
y	9	4	1	0	1	4	9



From the graph : $\therefore$ The S.S. $= \{1\}$

24 South Sinai

1

1 a 2 b 3 c 4 d 5 b 6 b

2

[a] $\because x^2 - 2x - 6 = 0$

$\therefore a = 1, b = -2, c = -6$

$\therefore x = \dfrac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-6)}}{2 \times 1}$

$= \dfrac{2 \pm \sqrt{28}}{2} = \dfrac{2 \pm 2\sqrt{7}}{2} = 1 \pm \sqrt{7}$

$\therefore x = 3.65$ or $x = -1.65$

$\therefore$ The S.S. $= \{3.65, -1.65\}$

[b] $\because n(x) = \dfrac{x}{x+2} + \dfrac{2x^3}{x^2(x+2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2, 0\}$

$, n(x) = \dfrac{x}{x+2} + \dfrac{2x}{x+2} = \dfrac{3x}{x+2}$

3

[a] $\because n(x) = \dfrac{x(x+2)}{(x-2)(x^2+2x+4)} \times \dfrac{x^2+2x+4}{x+2}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2\}$

$, n(x) = \dfrac{x}{x-2}$

[b] $\because 2x - y = 3$ (1)

$, x + 2y = 4$ $\therefore x = 4 - 2y$ (2)

Substituting from (2) in (1) : $\therefore 2(4 - 2y) - y = 3$

$\therefore 8 - 4y - y = 3$ $\therefore 8 - 5y = 3$

$\therefore -5y = -5$ $\therefore y = 1$

Substituting in (2) : $\therefore x = 2$

$\therefore$ The S.S. $= \{(2, 1)\}$

4

[a] $\because n_1(x) = \dfrac{x}{x(x+1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0, -1\}$

$, n_1(x) = \dfrac{1}{x+1}$ } (1)

$, \because n_2(x) = \dfrac{x^2(x^2-x+1)}{x^2(x^3+1)}$

$= \dfrac{x^2(x^2-x+1)}{x^2(x+1)(x^2-x+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0, -1\}$

$, n_2(x) = \dfrac{1}{x+1}$ } (2)

from (1) and (2) : $\therefore n_1 = n_2$

[b] $\because x - y = 7$ $\therefore x = y + 7$ (1)

$, xy = 60$ (2)

Substituting from (1) in (2) : $\therefore (y + 7)y = 60$

$\therefore y^2 + 7y - 60 = 0$ $\therefore (y + 12)(y - 5) = 0$

$\therefore y = -12$ or $y = 5$

Substituting in (1) : $\therefore x = -5$ or $x = 12$

$\therefore$ The S.S. $= \{(-5, -12), (12, 5)\}$

5

[a] $\because n(x) = \dfrac{x+1}{(x+2)(x+1)} - \dfrac{x+2}{(x+2)(x-2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-2, -1, 2\}$

$, n(x) = \frac{1}{x+2} - \frac{1}{x-2}$

$= \frac{x-2-(x+2)}{(x+2)(x-2)} = \frac{x-2-x-2}{(x+2)(x-2)}$

$= \frac{-4}{(x+2)(x-2)}$

[b] $\because$ A and B are mutually exclusive events

$\therefore P(A \cup B) = P(A) + P(B)$

$\therefore P(B) = P(A \cup B) - P(A) = \frac{5}{12} - \frac{1}{4} = \frac{1}{6}$

25 North Sinai

1

1 c   2 c   3 d   4 d   5 a   6 b

2

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{1}{2} + \frac{2}{5} - \frac{1}{5} = \frac{7}{10}$

2 $P(A - B) = P(A) - P(A \cap B)$

$= \frac{1}{2} - \frac{1}{5} = \frac{3}{10}$

[b] $\because n_1(x) = \frac{-1}{(x-3)(x+3)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{3, -3\}$

$, \because n_2(x) = \frac{7}{x}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0\}$

$\therefore$ The common domain $= \mathbb{R} - \{3, -3, 0\}$

3

[a] $\because x^2 - 2x - 4 = 0$

$\therefore a = 1, b = -2, c = -4$

$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{2 \pm \sqrt{20}}{2}$

$= \frac{2 \pm 2\sqrt{5}}{2} = 1 \pm \sqrt{5}$

$\therefore x \approx 3.24$ or $x \approx -1.24$

$\therefore$ The S.S. $= \{3.24, -1.24\}$

[b] $\because n(x) = \frac{x(x-2)}{(x-2)(x+2)} + \frac{2(x+3)}{(x+3)(x+2)}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -2, -3\}$

$, n(x) = \frac{x}{x+2} + \frac{2}{x+2} = \frac{x+2}{x+2} = 1$

4

[a] $\because x - y = 0$ $\therefore x = y$ (1)

$, x y = 16$ (2)

Substituting from (1) in (2) : $\therefore y^2 = 16$

$\therefore y = 4$ or $y = -4$

Substituting in (1) : $\therefore x = 4$ or $x = -4$

$\therefore$ The S.S. $= \{(4, 4), (-4, -4)\}$

[b] $\because n_1(x) = \frac{x^2}{x^2(x-1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_1 = \mathbb{R} - \{0, 1\} \\ , n_1(x) = \frac{1}{x-1}\end{array}\right\}$ (1)

$, \because n_2(x) = \frac{x(x^2+x+1)}{x(x^3-1)}$

$= \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_2 = \mathbb{R} - \{0, 1\} \\ , n_2(x) = \frac{1}{x-1}\end{array}\right\}$ (2)

from (1) and (2) : $\therefore n_1 = n_2$

5

[a] $\because n(x) = \frac{(x-1)(x-1)}{(x-1)(x^2+x+1)} \div \frac{x-1}{x^2+x+1}$

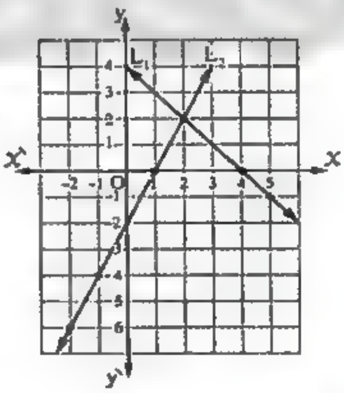
$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

$, n(x) = \frac{(x-1)(x-1)}{(x-1)(x^2+x+1)} \times \frac{x^2+x+1}{x-1} = 1$

[b] $x = 4 - y$ $y = 2x - 2$

x	2	4	5
y	2	0	-1

x	1	-1	-2
y	0	-4	-6



From the graph : $\therefore$ the S.S. $= \{(2, 2)\}$

26 Red Sea

1

1 c   2 b   3 a   4 b   5 c   6 d

2

[a] $\because 2x - y = 3$ (1)

$, x + 2y = 4$ $\therefore x = 4 - 2y$ (2)

Substituting from (2) in (1) :

$\therefore 2(4-2y) - y = 3$ $\therefore 8 - 4y - y = 3$

$\therefore 8 - 5y = 3$ $\therefore -5y = -5$ $\therefore y = 1$

Substituting in (2) : $\therefore x = 2$

$\therefore$ The S.S. $= \{(2, 1)\}$

[b] $\because n(x) = \frac{x^2}{x-1} - \frac{x}{x-1}$

$\therefore$ The domain of $n = \mathbb{R} - \{1\}$

$, n(x) = \frac{x^2}{x-1} - \frac{x}{x-1} = \frac{x^2 - x}{x-1} = \frac{x(x-1)}{x-1} = x$

3

[a] $\because x^2 - x - 4 = 0$

$\therefore a = 1, b = -1, c = -4$

$\therefore x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{1 \pm \sqrt{17}}{2}$

$\therefore x \approx 2.56$ or $x \approx -1.56$

[b] $\because n_1(x) = \frac{(x+1)(x^2 - x + 1)}{x(x^2 - x + 1)}$

$\therefore$ The domain of $n_1 = \mathbb{R} - \{0\}$
$, n_1(x) = \frac{x+1}{x}$ } (1)

$, \because n_2(x) = \frac{x^2(x+1) + x + 1}{x(x^2+1)} = \frac{x + 1(x^2+1)}{x(x^2+1)}$

$\therefore$ The domain of $n_2 = \mathbb{R} - \{0\}$
$, n_2(x) = \frac{x+1}{x}$ } (2)

From (1) and (2) : $\therefore n_1 = n_2$

4

[a] $\because x - y = 1$ $\therefore x = y + 1$ (1)

$, x^2 + y^2 = 25$ (2)

Substituting from (1) in (2) : $\therefore (y+1)^2 + y^2 = 25$

$\therefore y^2 + 2y + 1 + y^2 - 25 = 0$

$\therefore 2y^2 + 2y - 24 = 0$

$\therefore y^2 + y - 12 = 0$ $\therefore (y+4)(y-3) = 0$

$\therefore y = -4$ or $y = 3$

Substituting in (1) : $\therefore x = -3$ or $x = 4$

$\therefore$ The S.S. $= \{(-3, -4), (4, 3)\}$

[b] [1] $\because n(x) = \frac{x(x-2)}{(x-2)(x-3)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x-3)}{x(x-2)}$

$\therefore$ The domain of $n^{-1} = \mathbb{R} - \{0, 2, 3\}$

$, n^{-1}(x) = \frac{x-3}{x}$

[2] $\because n^{-1}(x) = 2$ $\therefore \frac{x-3}{x} = 2$

$\therefore x - 3 = 2x$ $\therefore x = -3$

5

[a] $\because n(x) = \frac{(x-2)(x^2+2x+4)}{(x-2)(x+3)} \times \frac{x+3}{x^2+2x+4}$

$\therefore$ The domain of $n = \mathbb{R} - \{2, -3\}$

$, n(x) = 1$

[b] [1] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

[2] $P(A - B) = P(A) - P(A \cap B) = 0.3 - 0.2 = 0.1$

27 Matrouh

1

[1] a [2] c [3] a [4] b [5] c [6] d

2

[a] $\because x + \frac{1}{x} + 3 = 0$ (Multiplying by x)

$\therefore x^2 + 1 + 3x = 0$ $\therefore x^2 + 3x + 1 = 0$

$\therefore a = 1, b = 3, c = 1$

$\therefore x = \frac{-3 \pm \sqrt{(3)^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{-3 \pm \sqrt{5}}{2}$

$\therefore x \approx -0.38$ or $x \approx -2.62$

The S.S. $= \{-0.38, -2.62\}$

[b] $\because n(x) = \frac{(x-1)(x+1)}{x(x-1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{0, 1\}$

$, n(x) = \frac{x+1}{x}$

3

[a] $\because n(x) = \frac{x-1}{(x-1)(x+1)} \div \frac{x(x-5)}{(x+1)(x-5)}$

$\therefore$ The domain of $n = \mathbb{R} - \{1, -1, 5, 0\}$

$, n(x) = \frac{x-1}{(x-1)(x+1)} \times \frac{(x+1)(x-5)}{x(x-5)} = \frac{1}{x}$

[b] Let the two positive numbers be x and y

$\therefore x + y = 9$ $\therefore y = 9 - x$ (1)

$, x^2 - y^2 = 27$ (2)

substituting from (1) in (2) :

$\therefore x^2 - (9 - x)^2 = 27$

$\therefore x^2 - (81 + 18x - x^2) = 27$

$\therefore x^2 - 81 + 18x - x^2 = 27$

$\therefore 18x = 108 \qquad \therefore x = 6$

Substituting in (1) : $\therefore y = 3$

$\therefore$ The two positive numbers are : 6 , 3

4

[a] $\boxed{1}$ $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

$\boxed{2}$ $P(A - B) = P(A) - P(A \cap B) = 0.3 - 0.2 = 0.1$

[b] $\because n_1(x) = \dfrac{x^2}{x^2(x-1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_1 = \mathbb{R} - \{0 , 1\} \\ , n_1(x) = \dfrac{1}{x-1}\end{array}\right\} (1)$

$, \because n_2(x) = \dfrac{x(x^2+x+1)}{x(x^3-1)} = \dfrac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\left.\begin{array}{l}\therefore \text{The domain of } n_2 = \mathbb{R} - \{0 , 1\} \\ , n_2(x) = \dfrac{1}{x-1}\end{array}\right\} (2)$

From (1) and (2) : $\therefore n_1 = n_2$

5

[a] $\because n(x) = \dfrac{3x}{(x+1)(x-2)} - \dfrac{x-1}{x^2-1}$

$= \dfrac{3x}{(x+1)(x-2)} - \dfrac{x-1}{(x-1)(x+1)}$

$\therefore$ The domain of $n = \mathbb{R} - \{-1 , 2 , 1\}$

$, n(x) = \dfrac{3x}{(x+1)(x-2)} - \dfrac{1}{x+1}$

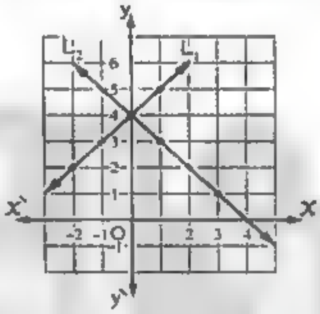
$= \dfrac{3x-(x-2)}{(x+1)(x-2)} = \dfrac{3x-x+2}{(x+1)(x-2)}$

$= \dfrac{2x+2}{(x+1)(x-2)} = \dfrac{2(x+1)}{(x+1)(x-2)} = \dfrac{2}{x-2}$

[b] $y = x + 4 \qquad x = 4 - y$

x	1	0	−2
y	5	4	2

x	3	1	0
y	1	3	4



From the graph : The S.S. = $\{(0 , 4)\}$

Governorates' Examinations

1 Giza Governorate

Answer the following questions :

1 Choose the correct answer :

(1) The set of zeroes of the function f : where $f(X) = -3X$ is .

(a) $\{0\}$ (b) $\{3\}$ (c) $\{-3\}$ (d) $\mathbb{R} - \{3\}$

(2) If $A \subset S$ of a random experiment , $P(A) = P(\grave{A})$, then $P(A) = \dots\dots$

(a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{1}{8}$

(3) If X is a negative number, then the greatest number of the following is ....

(a) $5X$ (b) $\frac{5}{X}$ (c) $5 + X$ (d) $5 - X$

(4) The domain of the function $f : f(X) = \frac{X - 3}{4}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{-4\}$ (c) $\mathbb{R} - \{-4 , 3\}$ (d) $\varnothing$

(5) If the sum of ages of a father and his sun now is 47 years , then the sum of their ages after 10 years = ... years.

(a) 27 (b) 37 (c) 57 (d) 67

(6) If the two equations $X + 2y = 1$, $2X + ky = 2$ has only one solution , then $k \neq \dots$

(a) 1 (b) 2 (c) 4 (d) -4

---

2 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations algebraically :

$X + 3y = 7$, $5X - y = 3$

[b] Find n (X) in its simplest form , showing the domain of n :

$$n(X) = \frac{X^2 + X}{X^2 - 1} - \frac{X + 5}{X^2 + 4X - 5}$$

---

3 [a] Find in $\mathbb{R}$ the solution set of the following equation by using the general rule :

$X^2 - 4X + 1 = 0$ rounding the results to two decimal places.

[b] If $n_1(X) = \frac{2X}{2X + 6}$, $n_2(X) = \frac{X^2 + 3X}{X^2 + 6X + 9}$, **then prove that :** $n_1 = n_2$

4 [a] If A and B are two events from a sample space of a random experiment , and $P(A) = 0.7$, $P(B) = 0.6$, $P(A \cap B) = 0.4$, **then find :**

(1) $P(A \cup B)$ (2) $P(A - B)$

[b] Find n (X) in its simplest form , showing the domain of n :

$$n(X) = \frac{X^3 - 8}{X^2 - 3X + 2} \times \frac{X + 1}{X^2 + 2X + 4}$$

---

5 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations :**

$X - y = 1$, $X^2 - y^2 = 25$

[b] If $n(X) = \dfrac{X^2 - 3X}{(X - 3)(X^2 + 2)}$

, then find : $n^{-1}(X)$ in the simplest form , showing the domain of n^{-1}

2 Alexandria Governorate

Answer the following questions :

1 **Choose the correct answer from those given ones :**

(1) If A , B are two mutually exclusive events , $P(B) = 0.5$ and $P(A \cup B) = 0.7$, then $P(A) = \dots\dots\dots$

(a) 0.02 (b) 0.2 (c) 0.5 (d) 0.13

(2) $(X + 1)^2 = \dots\dots$

(a) $X^2 + 1$ (b) $X^2 - 1$ (c) $X^2 - X + 1$ (d) $X^2 + 2X + 1$

(3) The additive inverse of the fraction $\dfrac{3}{X^2 + 1}$ is $\dots\dots\dots$

(a) $\dfrac{-3}{X^2 + 1}$ (b) $\dfrac{X^2 + 1}{3}$ (c) $\dfrac{-X^2 + 1}{3}$ (d) $\dfrac{3}{X^2 - 1}$

(4) If X is a negative real number , then the greatest number of the following numbers is $\dots\dots$

(a) $3 + X$ (b) $3X$ (c) $3 - X$ (d) $\dfrac{3}{X}$

(5) If $X = 2$ and $y = 3$, then $(y - 2X)^{10} = \dots\dots$

(a) 10 (b) -1 (c) -10 (d) 1

(6) The point of intersection of the two straight lines $X = 2$ and $X + y = 6$ is $\dots\dots$

(a) (2 , 6) (b) (2 , 4) (c) (4 , 2) (d) (6 , 2)

2 [a] If A and B are two events of the sample space (S) of a random experiment such that :

$P(A) = 0.7$, $P(A \cap B) = 0.3$ **Find :** $P(A - B)$

[b] Find n (x) in the simplest form showing the domain of n , where :

$$n(x) = \frac{x^2 + 2x + 4}{x^3 - 8} - \frac{9 - x^2}{x^2 + x - 6}$$

---

3 **[a] Find the common domain of n_1 , n_2 to be equal such that :**

$$n_1(x) = \frac{x^2 + 3x + 2}{x^2 - 4} \quad , \quad n_2(x) = \frac{x^2 - 1}{x^2 - 3x + 2}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x + y = 7$, $x^2 + y^2 = 25$

---

4 **[a] Find n (x) in the simplest form showing the domain of n , where :**

$$n(x) = \frac{x}{x - 2} \div \frac{x + 3}{x^2 - x - 2}$$

[b] Find in $\mathbb{R}$ the solution set of the equation : $3x^2 - 5x - 4 = 0$

, by using the general rule , rounding the result to two decimal places.

---

5 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations graphically :**

$x + y = 4$, $2x - y = 2$

[b] If set of zeroes of the function $f : f(x) = a x^2 + x + b$ is $\{0 , 1\}$

find the value of each two constants a and b

3 El-Kalyoubia Governorate

Answer the following questions :

1 **Choose the correct answer :**

(1) Twice the number x subtracted by 3 is ....

(a) $x - 3$ (b) $2x + 3$ (c) $2x - 3$ (d) $3 - 2x$

(2) The domain of the function f where $f(x) = \frac{x + 2}{5x}$ is ....

(a) $\mathbb{R} - \{5\}$ (b) $\mathbb{R} - \{-5\}$ (c) $\mathbb{R}$ (d) $\mathbb{R} - \{\text{zero}\}$

(3) If $P(A) = 4 P(\grave{A})$, then $P(A) =$ ....

(a) 0.8 (b) 0.6 (c) 0.4 (d) 0.2

(4) If x is a negative number , then the greatest number of the following is ....

(a) $5 - x$ (b) $5 + x$ (c) $\frac{5}{x}$ (d) $5x$

(5) If $2^7 \times 3^7 = 6^k$, then k = ...

(a) 14 (b) 7 (c) 6 (d) 5

(6) If $x^2 - y^2 = 2(x + y)$ where $(x + y) \neq$ zero , then $(x - y) =$ ....

(a) 2 (b) 4 (c) 6 (d) 8

---

2 [a] If $n(x) = \dfrac{x^3 - 8}{x^2 - x - 2} \div \dfrac{x^2 + 2x + 4}{2x^2 - x - 3}$

Find $n(x)$ in its simplest form showing the domain of n

[b] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$2x = 1 - y$, $x + 2y = 5$ in $\mathbb{R} \times \mathbb{R}$

---

3 [a] If A , B are two events in a random experiment , P (A) = 0.7 , P (B) = 0.6 and $P(A \cap B) = 0.4$

Find : (1) $P(A \cup B)$ (2) $P(A - B)$

[b] **Find the solution set of the two equations :** $y - x = 3$, $x^2 + y^2 - xy = 13$ in $\mathbb{R}^2$

---

4 [a] If $n(x) = \dfrac{x^2 + x}{x^2 - 1} - \dfrac{x - 5}{x^2 - 6x + 5}$ Find $n(x)$ in its simplest form , showing the domain of n

[b] By using the formula , find in $\mathbb{R}$ the solution set of the equation : $x^2 - 2x - 6 = 0$

(Approximate to the nearest one decimal)

---

5 [a] If $n_1(x) = \dfrac{x^2 + 2x}{x^2 + 4x + 4}$, $n_2(x) = \dfrac{2x}{2x + 4}$, **prove that :** $n_1 = n_2$

[b] If $n(x) = \dfrac{x - 2}{x + 1}$

Find : (1) The domain of n^{-1} (2) $n^{-1}(3)$

4 El-Sharkia Governorate

Answer the following questions : (Calculator is allowed)

1 **Choose the correct answer from those given :**

(1) In the experiment of rolling a regular die once , the probability of appearance of an even number on the upper face =

(a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{5}{6}$

(2) The set of zeroes of the function $f : f(x) = x^2 + 1$ is ....

(a) $\{1\}$ (b) $\{-1\}$ (c) $\{-1 , 1\}$ (d) $\varnothing$

(3) The point of intersection of the two straight lines $x + 2 = 0$ and $y - 3 = 0$ is ...

(a) $(-2 , -3)$ (b) $(-2 , 3)$ (c) $(2 , -3)$ (d) $(2 , 3)$

(4) If $2^5 \times 3^5 = m \times 6^4$, then $m =$ ....

(a) 1 (b) 2 (c) 3 (d) 6

(5) The domain of the multiplicative inverse of the algebraic fraction $\frac{x+2}{x+5}$ is ...

(a) $\mathbb{R}$ (b) $\mathbb{R} \quad \{-5\}$ (c) $\mathbb{R} - \{-2\}$ (d) $\mathbb{R} - \{-2 , -5\}$

(6) If $(7^{a-2} , 3) = (1 , b + 5)$, then $a + b =$ ....

(a) -1 (b) zero (c) 1 (d) 2

---

2 **[a] By using the general rule solve in $\mathbb{R}$ the equation :** $x(x - 1) = 4$ taking $\sqrt{17} \approx 4.12$

[b] If A and B are two events in a sample space for a random experiment , and if

$P(A) = 0.8$, $P(B) = 0.7$ and $P(A \cap B) = 0.6$

Find : (1) The probability of non occurrence of the event A

(2) The probability of occurrence one of the two events at least.

---

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x \quad y = 4$, $3x + 2y = 7$

[b] If $n_1(x) = \frac{x^2 - 3x + 9}{x^3 + 27}$, $n_2(x) = \frac{2}{2x + 6}$ **Prove that :** $n_1 = n_2$

---

4 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :** $x - y = 1$, $x^2 - y^2 = 5$

[b] Find n (x) in the simplest form showing the domain :

$n(x) = \frac{x^2 + 2x + 4}{x^3 \quad 8} - \frac{9 \quad x^2}{x^2 + x - 6}$ **and find :** n (58)

---

5 **[a]** If $n(x) = \frac{x^3 - x}{x^2 \quad 2x + 1} \times \frac{2x - 2}{x^2 + x}$

Find : n (x) in the simplest form showing the domain.

[b] If the set of zeroes of the function f where $f(x) = \frac{a x^2 \quad 6x + 8}{b x - 4}$ is $\{4\}$ and its domain is $\mathbb{R} - \{2\}$, **then find :** a , b

5 El-Monofia Governorate

Answer the following questions :

1 Choose the correct answer :

(1) If $a < \sqrt{3} < b$, then (a , b) is ....

(a) (0 , 1) (b) (2.5 , 3.5) (c) (1 , 2) (d) (2 , 3)

(2) If the curve of the quadratic function does not intersect the X-axis at any point , then the number of solutions of the equation $f(X) = 0$ in $\mathbb{R}$ is ....

(a) zero (b) one solution. (c) two solutions. (d) an infinite number.

(3) If $2^8 \times 3^8 = X \times 6^8$, then $X =$ ....

(a) 2 (b) 3 (c) 6 (d) 1

(4) The set of zeroes of the function $f : f(X) = \frac{X^2 - 9}{X - 3}$ is ....

(a) $\{3\}$ (b) $\{-3\}$ (c) $\{3 , -3\}$ (d) $\varnothing$

(5) If $f(X) = 6X^2 + 3X(1 - 2X)$ is a polynomial function , then its degree is ....

(a) first. (b) second. (c) third. (d) fourth.

(6) If A and B are two mutually exclusive events of random experiment then :
$P(A \cap B) =$ ....

(a) $P(A \cup B)$ (b) $P(A) + P(B)$ (c) $\varnothing$ (d) zero

2 [a] If $(2a + b , 3) = (18 , a - b)$:

Find the value of a and b (Indicating the steps of the solution).

[b] By using the general formula , find in $\mathbb{R}$ the solution set for the following equation :

$(X - 4)(X - 2) = 1$ (knowing that : $\sqrt{2} \approx 1.41$)

3 [a] If the domain of the function n where : $n(X) = \frac{4}{X + a} + \frac{b}{2X}$

is $\mathbb{R} - \{0 , -5\}$ and n (3) = 1 , find the values of a and b

[b] Find n (X) in the simplest form showing the domain where :

$$n(X) = \frac{X^2 + 4X + 3}{X - 1} \div \frac{X^2 + 3X}{X^2 - X}$$

4 [a] **Find n (X) in the simplest form showing the domain where :**

$n(X) = \frac{X^2 + X + 1}{X^4 - X} + \frac{X + 3}{3 - 2X - X^2}$ and if n (a) = 2 , find the value of a

[b] A right angled triangle in which the length of one of the sides of right angled is 5 cm. and its perimeter is 30 cm. Find the area of the triangle.
(Indicating the steps of the solution).

---

5 **[a]** If $n_1(X) = \dfrac{X^2 - 4}{X^2 + X - 6}$, $n_2(X) = \dfrac{X^3 - X^2 - 6X}{X^3 - 9X}$

Prove that : $n_1(X) = n_2(X)$ for all values of X which belong to the common domain and find this domain.

[b] If A and B are two events of the sample space of a random experiment
$P(A) = \frac{5}{9}$, $P(B) = \frac{2}{9}$, $P(A \cap B) = \frac{1}{9}$

Find : (1) $P(A \cup B)$

(2) The probability of non occurrence any of the two events.

(3) The probability of occurrence of event A only.

6 El-Gharbia Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

(1) If the solution set of the equation $X^2 - aX + 4 = 0$ is $\{-2\}$, then a = ...

(a) -2 (b) -4 (c) 2 (d) 4

(2) If $n(X) = \dfrac{X+2}{X - 5}$, then the domain of n^{-1} is ...

(a) $\{2 , -5\}$ (b) $\{-2 , 5\}$ (c) $\mathbb{R} - \{-2 , 5\}$ (d) $\mathbb{R} - \{2 , 5\}$

(3) If A and B are two mutually exclusive events of a random experiment
, if $P(A) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$, then $P(B) =$ ....

(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) 1

(4) The set of zeroes of the function $f : f(X) = \dfrac{X^2 - X - 2}{X^2 + 4}$ is ....

(a) $\{2 , -2\}$ (b) $\{-2 , -1\}$ (c) $\{2 , -1\}$ (d) $\{1 , -1\}$

(5) The point of intersection of the two straight lines : $y = 2$, $X + y = 6$ is ....

(a) $(4 , 2)$ (b) $(2 , 4)$ (c) $(2 , 2)$ (d) $(4 , 4)$

(6) If the curve of the function $f : f(X) = X^2 - X + c$ passing through the point $(2 , 1)$, then c = ...

(a) 2 (b) 1 (c) -2 (d) -1

2 [a] Find in $\mathbb{R}$ the solution set of the following equation , using the general rule , rounding the results to two decimal places : $X(X-1)=4$

[b] **Find :** $n(X)=\dfrac{X^3-8}{X^2+X-6}\times\dfrac{X+3}{X^2+2X+4}$ in the simplest form showing the domain.

---

3 **[a] Find in $\mathbb{R}\times\mathbb{R}$ the solution set of the two equations :** $y-X=2$ and $X^2+Xy-4=0$

[b] Find n (X) in the simplest form , showing the domain where : $n(X)=\dfrac{3}{X+1}+\dfrac{2X+1}{1-X^2}$

---

4 [a] Draw the graphical representation of the function $f(X)=X^2-2X-3$ in the interval $[-2, 4]$ and from the drawing , find the solution set of the equation $X^2-2X-3=0$

[b] Find n (X) in the simplest form , showing the domain of n where :.

$n(X)=\dfrac{X^2-2X+1}{X^3-1}\div\dfrac{X-1}{X^2+X+1}$

---

5 [a] If $n(X)=\dfrac{X^2-2X}{(X-2)(X^2+2)}$

(1) Find $n^{\;1}(X)$ in the simplest form and determine the domain of n^{-1}

(2) If $n^{\;1}(X)=3$ what is the value of X ?

[b] If A and B are two events in the sample space of a random experiment and if

$P(A)=0.7$, $P(B)=0.6$ and $P(A\cap B)=0.4$

Find : (1) $P(A\cup B)$

(2) Probability occurrence of one event without the other.

7 El-Dakahlia Governorate

Answer the following questions : *(Calculators are permitted)*

1 **[a] Choose the correct answer from the given answers :**

(1) The point of intersection of the two straight lines : $X+2=0$ and $y=X$ is ....

(a) (2 , 2) (b) (2 , 0) (c) (– 2, 2) (d) (0 , 0)

(2) If $n(X)=\dfrac{X+1}{X-2}$ is an algebraic fraction , then the domain in which the fraction has multiplicative inverse is .... .

(a) $\mathbb{R}-\{2\}$ (b) $\mathbb{R}\ \{-1, 2\}$ (c) $\mathbb{R}-\{-1\}$ (d) $\{-1, 2\}$

(3) If there is only one solution for the equation :

$x + 2y = 1$ and $2x + ky = 2$ in $\mathbb{R} \times \mathbb{R}$, then k cannot equal ....

(a) 2 (b) 4 (c) -2 (d) -4

[b] Find in $\mathbb{R}$ the solution set of the equation $x(x-3) = \ \ 1$, using the general formula (approximating the results to the nearest tenth)

---

2 **[a] Choose the correct answer from the given answers :**

(1) If the curve of the quadratic function f passes through the points $(2, 0)$, $(-3, 0)$ and $(0, -6)$, then the solution set of the equation $f(x) = 0$ in $\mathbb{R}$ is ... .

(a) $\{-2, 3\}$ (b) $\{3, 2\}$ (c) $\{2, -3\}$ (d) $\{-3, -6\}$

(2) The simplest form of the function n : $n(x) = \frac{3-x}{x \ \ 3}$ such that $x \in \mathbb{R} - \{3\}$ is . ...

(a) 1 (b) -1 (c) 3 (d) -3

(3) If A is an event of random experiment , then $P(\grave{A}) =$ ....

(a) 1 (b) -1 (c) $1 - P(A)$ (d) $P(A) - 1$

[b] If $(a, 2b)$ is a solution for the equations $3x - y = 5$ and $x + y = -1$, find the value of a and b

---

3 **[a]** n_1 , n_2 are two algebraic fractions such that : $n_1(x) = \frac{x^2 - 4}{x^2 + x \ \cdot 6}$ and $n_2(x) = \frac{x^2 - x - 6}{x^2 - 9}$

Prove that : $n_1(x) = n_2(x)$ for all values of x which belong to the common domain and find this domain.

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of pair of equations : $x + y = 3$ and $x^2 + xy = 6$

---

4 **[a]** If $n(x) = \frac{x^2 + 3x}{x^2 + 2x - 3} - \frac{\cdot \ x - 2}{x^2 - 3x + 2}$

Find n (x) in simplest form showing the domain of n

[b] Find n (x) in simplest form showing the domain of n , such that :

$n(x) = \frac{x^3 - x^2 - 2x}{x^2 - 5x + 6} \times \frac{x^2 + 2x \ \ 15}{x^3 + 6x^2 + 5x}$, then find n (7) , n (3) if possible.

---

5 **[a]** If $f_1(x) = \frac{x - a}{x + b}$, and the set of zeroes of f_1 is $\{5\}$, and the domain of f_1 is $\mathbb{R} \ \ \{3\}$, then find the values of a and b

If $f_2(x) = \frac{x - 1}{x \ \ 3}$, then find $f_1(x) + f_2(x)$ in the simplest form.

[b] If A and B are two events in a sample space of a random experiment and $P(A) = 0.7$, $P(B) = 0.6$ and $P(A \cap B) = 0.4$, **then find :**

(1) $P(A \cup B)$

(2) The probability of occurrence of one of the two events but not the other.

8 Ismailia Governorate

Answer the following questions : (Calculators are permitted)

1 Choose the correct answer from those given answers :

(1) If the age of a man now is X year , then his age after 5 years from now is ...... years.

(a) $X - 5$ (b) $5 \quad X$ (c) $5X$ (d) $X + 5$

(2) The set of zero is of f where $f(X) = X(X^2 - 2X + 1)$ is ....

(a) $\{0 , 1\}$ (b) $\{0 , -1\}$ (c) $\{-1 , 1\}$ (d) $\{0 , 1 , -1\}$

(3) If $(5 , X - 4) = (y , 3)$, then $X + y =$ ....

(a) 25 (b) 12 (c) 8 (d) 6

(4) Number of solutions of the two equations : $X + y = 2$, $y - 3 = 0$ together is ....

(a) 3 (b) 2 (c) 1 (d) zero

(5) If A and B are two mutually exclusive events , then $P(A - B) =$ ....

(a) zero (b) $P(A)$ (c) $P(B)$ (d) $P(A \cup B)$

(6) If the curve of the function f where $f(X) = X^2 \quad a$ passes through the point $(1 , 0)$, then $a =$ ....

(a) 2 (b) -1 (c) zero (d) 1

2 [a] Find the solution set of the following equation in $\mathbb{R}$:

$X(X - 2) = 4$ (knowing that : $\sqrt{5} \simeq 2.2$)

[b] If $n(X) = \dfrac{X^2 - 2X}{X^2 \quad 5X + 6}$

Find : $n^{-1}(X)$ in the simplest form showing the domain of $n^{\ 1}$

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations (algebraically) :

$X + y = 5$, $X^2 + Xy = 15$

[b] Find $n(X)$ in the simplest form where : $n(X) = \dfrac{X}{X \quad 4} \quad \dfrac{4X + 16}{X^2 - 16}$

4 [a] A classroom consists of 40 students , 30 of them succeeded in math. 24 in science and 20 in both math. and science. If a student is chosen randomly.

Find the probability that this student is :

(1) fail in math. (2) succeeded in math. or science

[b] Find n (X) in the simplest form showing the domain of n :

$$n(X) = \frac{X^2 - X - 2}{X^2 - 1} \div \frac{X - 5}{X^2 - 6X + 5}$$

---

5 [a] **Find n (X) in the simplest form where :** $n(X) = \frac{X^2 + 2X + 4}{X^3 - 8} + \frac{1}{X + 2}$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations (graphically) :

$y = 3X - 1$, $X - y + 1 = \text{zero}$

9 Suez Governorate

Answer the following questions : (Calculators are permitted)

1 **Choose the correct answer from those given :**

(1) The set of zeroes of f where $f(X) = (X - 1)^2 (X + 2)$ is ... .

(a) $\{1, -2\}$ (b) $\{1, 2\}$ (c) $\{-1, -2\}$ (d) $\{1, 2\}$

(2) If $X - y = 2$, $X^2 - y^2 = 10$, then $X + y =$ ....

(a) 5 (b) 2 (c) 2 (d) 5

(3) If $A \subset S$ of a random experiment , $P(A) = P(\grave{A})$, then $P(A) =$ ... . .

(a) zero (b) 1 (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

(4) If X is a negative number , then the greatest number is ....

(a) $3 + X$ (b) $3 - X$ (c) $3X$ (d) $\frac{3}{X}$

(5) If $X = 3$ belongs to the solution set of the equation : $X^2 - aX - 6 = 0$, then a = ...

(a) 3 (b) 2 (c) 1 (d) - 1

(6) The function f where $f(X) = \frac{X - 3}{X - 4}$ has additive inverse in the domain ....

(a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{4\}$ (c) $\mathbb{R} - \{-4\}$ (d) $\mathbb{R} - \{-3\}$

2 **[a] Find the solution set in $\mathbb{R} \times \mathbb{R}$: $2x - y = 7$, $3x + y = 8$**

(Explain your answer showing the steps solution)

[b] Find n (x) in the simplest form showing the domain of n where :

$$n(x) = \frac{x}{x+1} + \frac{x^2}{x^3 + x^2}$$, then calculate n (3)

---

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :**

$x - 1 = 0$, $x^2 + y^2 = 10$

[b] If the fraction $\frac{x+2}{x^2-4}$ is the multiplicative inverse of $\frac{x-2}{h}$ where $x \notin \{2, -2\}$,

then calculate h

---

4 **[a] Find in $\mathbb{R}$ the solution set for the following equations by using the formula in :**

$x^2 - 3x + 1 = 0$, knowing that $\sqrt{5} = 2.24$

[b] If $n_1(x) = \frac{3x}{3x+3}$, $n_2(x) = \frac{x^2 + x}{x^2 + 2x + 1}$ **Prove that :** $n_1 = n_2$

---

5 **[a] Find n (x) in the simplest form showing the domain of n where :**

$$n(x) = \frac{x^2 + 2x + 1}{2x - 8} \quad \frac{x - 4}{x + 1}$$

[b] If A and B are two events from the sample of a random experiment and

P (A) = 0.6 , P (B) = 0.3 , P $(A \cap B)$ = 0.5

Find : (1) P $(A \cup B)$ (2) P $(\grave{B})$

10 Port Said Governorate

Answer the following questions :

1 **Choose the correct answer from those given :**

(1) If the two equations : $x + 3y = 4$, $x + ay = 7$ represent two parallel straight lines , then a = ...

(a) $\frac{1}{3}$ (b) -3 (c) 3 (d) 1

(2) The domain of the multiplicative inverse of the fraction : $\frac{x-2}{x^3+27}$ is ......

(a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{-3, 2\}$ (c) $\mathbb{R} - \{2, -3, 3\}$ (d) $\mathbb{R} - \{3, -3\}$

(3) If $X^2 - y^2 = 2(X + y)$ such that : $X + y \neq 0$, then $X - y =$ ………….

(a) 2　　(b) 4　　(c) 6　　(d) 8

(4) If a die is tossed once , then the probability of appearance of an odd number equals …

(a) $\frac{1}{3}$　　(b) $\frac{1}{2}$　　(c) 1　　(d) 3

(5) The degree of the equation : $3X + 4y + Xy = 5$ is ……………

(a) zero.　　(b) first.　　(c) second.　　(d) third.

(6) If $2X = 1$, then $\frac{1}{5}X =$ ……… … …

(a) $\frac{2}{5}$　　(b) $\frac{1}{5}$　　(c) $\frac{1}{2}$　　(d) $\frac{1}{10}$

---

2 **[a] Solve in $\mathbb{R}$ the equation :** $2X(X - 5) = 1$ approximate to the nearest one decimal.

[b] Find the common domain of $n_1(X)$, $n_2(X)$ to be equal such that :

$$n_1(X) = \frac{X^2 + 9X + 20}{X^2 - 16} \quad , \quad n_2(X) = \frac{X^2 + 5X}{X^2 - 4X}$$

---

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$$X - 2y = 0 \quad , \quad X^2 - y^2 = 3$$

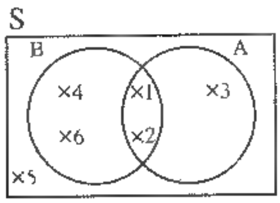
[b] If $n(X) = \frac{X + 3}{X^2 + 5X - 14} \div \frac{X^2 + 3X}{2X + 14}$

Find : $n(X)$ in its simplest form , showing the domain of n

---

4 **[a] Find n in its simplest form , showing its domain where :** $n(X) = \frac{X^2 + X}{X^2 - 1} + \frac{X - 5}{X^2 - 6X + 5}$

[b] Use the opposite Venn diagram to calculate the probability of :



(1) Non occurrence of the event A

(2) The occurrence of the event B only.

(3) Occurrence of A or B

---

5 **[a]** If $n(X) = \frac{X^2 - 2X}{(X - 2)(X + 2)}$

(1) **Find :** $n^{1}(X)$　　(2) If $n^{-1}(X) = 3$ what is the value of X ?

[b] Two number , if three times a number is added to twice a second number the sum is 13 and if the first number is added to three times the second number the sum is 16 , find the two number.

11 Damietta Governorate

Answer the following questions : ***(Calculators are permitted)***

1 Choose the correct answer from the given ones :

(1) The solution set of the equation : $a x^2 + b x + c = 0$, $a \neq 0$ graphically is the set of x coordinates of the points of intersection of the curve of the function $f : f(x) = a x^2 + b x + c$ with the ....

(a) y-axis (b) x-axis (c) symmetric line (d) straight line $y = 2$

(2) If $a b = 12$, $b c = 20$, $a c = 15$, $a \in \mathbb{R}^+$, $b \in \mathbb{R}^+$, $c \in \mathbb{R}^+$, then $a b c =$ ....

(a) 360 (b) 3600 (c) 60 (d) 36

(3) If the algebraic fraction $\frac{x - a}{x + 5}$ have a multiplicative inverse which is $\frac{x + 5}{x + 3}$, then a = ...

(a) 3 (b) 5 (c) -3 (d) 5

(4) $\sqrt{(-2)^4 + 3^2} =$ .... $+ 3$

(a) 2^2 (b) 2 (c) -2 (d) $(-2)^2$

(5) If $P(A) = P(\grave{A})$, then $P(A) =$ ....

(a) $\frac{1}{2}$ (b) 1 (c) $\frac{3}{4}$ (d) 0

(6) $x^3 - 1 =$ ....

(a) $(x^2 - 1)(x + 1)$ (b) $(x - 1)(x^2 + 2x + 1)$

(c) $(x - 1)(x^2 + x + 1)$ (d) $(x - 1)(x^2 - 2x - 1)$

---

2 [a] Find : $n(x) = \frac{x - 3}{x^2 \quad 7x + 12} - \frac{4}{x^2 - 4x}$ in the simplest from showing the domain of n

[b] Find the value of a and b , knowing that : $\{(3 , \quad 1)\}$ is the solution set of the two equations : $a x + b y - 5 = 0$, $3 a x + b y = 17$

---

3 [a] Find in $\mathbb{R}$ the solution set for the equation $x(x - 1) = 4$ using the general rule to the nearest hundredth.

[b] Find the common domain of f_1 , f_2 to be equal such that :

$f_1(x) = \frac{x^2 + x \quad 12}{x^2 + 5x + 4}$, $f_2(x) = \frac{x^2 \quad 2x \quad 3}{x^2 + 2x + 1}$

4 [a] Two acute angles in a right-angled triangle the difference between their measures is 50°
Find the measure of each angle.

[b] Find n (X) in the simplest form showing the domain :

$$n(X) = \frac{X^2 - 3X + 2}{X^2 - 1} \div \frac{3X - 15}{X^2 - 4X - 5}$$

---

5 [a] If A and B are two events from a sample space of a random experiment and
$P(A) = 0.4$, $P(B) = 0.5$, $P(A \cup B) = 0.7$

Find : (1) $P(A \cap B)$ (2) $P(B - A)$

[b] If $n(X) = \dfrac{X + \frac{1}{X}}{4X + \frac{4}{X}}$ Find n (X) in the simplest form showing the domain.

12 Kafr El-Sheikh Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **[a] Choose the correct answer from those given :**

(1) If $X = y + 1$, $(X - y)^2 + y = 3$, then y = ...

(a) zero (b) 1 (c) 2 (d) 3

(2) If $a b = 3$, $a b^2 = 12$, then b = ...

(a) 4 (b) 2 (c) − 2 (d) ± 2

(3) If $n(X) = \dfrac{X - 1}{X - 2}$, then the domain of n^{-1} = ...

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{1\}$ (c) $\mathbb{R} - \{2\}$ (d) $\mathbb{R} - \{1, 2\}$

[b] Solve in $\mathbb{R} \times \mathbb{R}$ the two simultaneous equations :

$X - y = 1$, $X^2 + y^2 = 25$

---

2 **[a] Choose the correct answer from those given :**

(1) The probability of the impossible event equals ....

(a) $\varnothing$ (b) zero (c) 1 (d) − 1

(2) If the solution set of the equation : $X^2 + m X + 9 = 0$ is $\{-3\}$, then m = ...

(a) 5 (b) 6 (c) ± 6 (d) zero

(3) If the two equations : $X + 3y = 6$, $2X + ky = 12$ have an infinite number of solution in $\mathbb{R} \times \mathbb{R}$, then k = ...

(a) 2 (b) 6 (c) 3 (d) 1

[b] Two acute angles in a right-angled triangle the difference between their measures is 50°
Find the measure of each angle.

3 [a] **Solve in $\mathbb{R}$ using the (general rule) the equation :** $3x^2 = 5x + 4$ approximating the result to the nearest two decimals.

[b] **Find n (x) in the simplest form showing the domain of n where :**

$n(x) = \frac{3}{x+1} + \frac{2x+1}{1-x^2}$

4 [a] If A , B are two events from a sample space of random experiment , and
$P(B) = \frac{1}{12}$, $P(A \cup B) = \frac{1}{3}$ **, then find P (A) if :**

(1) A and B are two mutually exclusive events. (2) $B \subset A$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$ **Prove that :** $n_1 = n_2$

5 [a] If $n(x) = \frac{x^2 - 5x}{(x \quad 5)(x^2 + 1)}$

(1) Find $n^{-1}(x)$ and identify the domain of n^{-1}

(2) If $n^{-1}(x) = 2$, find the value of x

[b] If $n(x) = \frac{x^2 \quad 3x}{x^2 - 9} \div \frac{2x}{x+3}$

Find n (x) in the simplest form showing the domain of n

13 El-Beheira Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer from the given ones :**

(1) If $f(x) = 2x$, then $f(1) - f(-1) = \dots\dots$

(a) zero (b) 4 (c) 2 (d) 2

(2) The two straight lines : $x + 5y = 1$, $x + 5y - 8 = 0$ are $\dots\dots$

(a) parallel. (b) coincide.
(c) intersect and non perpendicular. (d) perpendicular.

(3) If $n(X^2) = 9$, then $n(X) = \dots\dots$

(a) 81 (b) 3 (c) ± 3 (d) -3

(4) If $n(X) = \dfrac{X-2}{X^2 - X - 6}$, then the domain of n^{-1} is ....

(a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{-2, 3\}$ (c) $\mathbb{R} - \{-2, 2\}$ (d) $\mathbb{R} - \{-2, 2, 3\}$

(5) The degree of the equation : $3X + 4y + Xy = 5$ is ....

(a) zero. (b) first. (c) second. (d) third.

(6) A card is drawn randomly from 20 identical cards numbered from 1 to 20 , then the probability that the number of the drawn card multiple of 7 is ....

(a) 10 % (b) 15 % (c) 20 % (d) 25 %

---

2 **[a] Solve in $\mathbb{R}$ the equation :** $3X^2 = 5X + 4$ approximating the result to the nearest two decimals.

[b] Simplify the function n (X) where :

$n(X) = \dfrac{3X}{X^2 - 2X} - \dfrac{12}{X^2 - 4}$ showing the domain of n

---

3 [a] If $f(X) = \dfrac{X^2 - 9}{X + b}$, $f(4) = 1$ **Find :** b

[b] If A and B are two events in a random experiment

, $P(A) = 0.7$, $P(B) = 0.6$ and $P(A \cap B) = 0.4$

Find the probability of :

(1) Non occurrence of the event A

(2) Occurrence of one of the events but not the other.

---

4 [a] The sum of two rational numbers is 12 , and three times the smallest number exceeds than twice the greatest number by one Find the two numbers.

[b] If $n_1(X) = \dfrac{X^2}{X^3 - X^2}$, $n_2(X) = \dfrac{X^3 + X^2 + X}{X^4 - X}$, **then prove that :** $n_1 = n_2$

---

5 **[a] Solve in $\mathbb{R} \times \mathbb{R}$ the two equations :** $X - y = 1$, $X^2 + y^2 = 25$

[b] If $f(X) = \dfrac{X^2 - 49}{X^3 - 8} \div \dfrac{X + 7}{X - 2}$

Find : $f(X)$ in its simplest form showing the domain of f

14 El-Fayoum Governorate

Answer the following questions : ***(Calculators are permitted)***

1 Choose the correct answer from the given ones :

(1) $\left(2\sqrt{2}\right)^4 = \dots\dots\dots$

(a) 8 (b) 16 (c) 32 (d) 64

(2) If A and B are mutually exclusive events from the sample space of a random experiment , then P $(A \cap B) = \dots\dots\dots$

(a) 1 (b) zero (c) $\frac{1}{2}$ (d) -1

(3) If $x = 1$ is the solution of the equation : $x^2 + m\,x + 4 = 0$, then m $= \dots\dots\dots$

(a) 1 (b) -1 (c) zero (d) -5

(4) If $2\,x^2 = 5$, then $6\,x^2 = \dots\dots\dots$

(a) 5 (b) 10 (c) 15 (d) 20

(5) If $n(x) = \frac{x}{x-1}$, then the domain of $n^{-1} = \dots\dots\dots$

(a) $\mathbb{R} - \{0\}$ (b) $\mathbb{R} - \{1\}$ (c) $\mathbb{R} - \{0 , 1\}$ (d) $\mathbb{R} - \{-1\}$

(6) The sum of two consecutive integers is 17 , then the smaller number of them is . . .

(a) 8 (b) 9 (c) 17 (d) 72

---

2 [a] If $n(x) = \frac{x^2 + x}{x^2 - x - 2} - \frac{2x + 4}{x^2 - 4}$, find n (x) in the simplest form showing the domain of n

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$y = x + 1$, $x^2 + y^2 = 13$

---

3 [a] By using the general rule find in $\mathbb{R}$ the solution set of the equation :

$x^2 - 5\,x + 3 = 0$, approximating the result to the nearest one decimal digit.

[b] Find n (x) in the simplest form showing the domain of n where :

$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \div \frac{x^2 + x + 1}{2x - 2}$

---

4 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations graphically :

$y = x + 1$, $2\,x + y = 7$

[b] Find the set of zeroes of the function f : $f(x) = \frac{x - 1}{x + 1}$, then find $f^{-1}(2)$

5 **[a] Find the common domain of n_1 and n_2 to be equal such that :**

$$n_1(X) = \frac{X^2 + 2X}{X^2 + 3X + 2} \quad , \quad n_2(X) = \frac{X^2 - X}{X^2 - 1}$$

[b] A bag contains 10 identical cards numbered from 1 to 10 , one card of them is drawn randomly , calculate the probability that the number on the drawn card is :

(1) A prime number. (2) A number divisible by 5

15 Beni Suef Governorate

Answer the following questions : (Calculator is allowed)

1 **Choose the correct answer from those given :**

(1) The probability of the impossible event equals ....

(a) $\varnothing$ (b) 1 (c) zero (d) -1

(2) If $2^X = 8$, then $X =$ ....

(a) zero (b) 1 (c) 2 (d) 3

(3) If the two straight lines which represent the two equations :

$X + 2y = 4$, $2X + ky = 11$ are parallel , then k = ...

(a) 4 (b) 1 (c) -1 (d) -4

(4) If a is a negative number , then the greatest number is ....

(a) $3 + a$ (b) $3 - a$ (c) $3a$ (d) $\frac{3}{a}$

(5) The solution set of the equation : $X^2 + 1 = 0$ in $\mathbb{R}$ is ....

(a) $\{1\}$ (b) $\{1 , -1\}$ (c) $\{-1\}$ (d) $\varnothing$

(6) If $n(X) = \frac{X - 1}{X + 2}$, then $n^{-1}(1)$ is ....

(a) -1 (b) zero (c) 3 (d) undefined.

---

2 **[a] Find the set of zeroes of the function $f : f(X) = X^3 - X$**

[b] Find in $\mathbb{R}$ the solution set of the following equation by using the general formula :

$X^2 - 5X + 3 = 0$ approximating the result to the nearest one decimal digit.

---

3 **[a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$X + y = 4$, $2X - y = 2$

[b] If A and B are two events from a sample space of a random experiment , $P(A) = 0.6$, $P(B) = 0.5$ and $P(A \cap B) = 0.3$

Find : (1) $P(A - B)$ (2) $P(A \cup B)$

4 [a] If $n_1(x) = \frac{x^2 - 2x + 4}{x^3 + 8}$, $n_2(x) = \frac{3}{3x + 6}$

Prove that : $n_1 = n_2$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$x - 2 = 0$, $x^2 + xy + y^2 = 7$

5 [a] Find $n(x) = \frac{x^2 - 3x + 2}{x^2 - 1} \div \frac{3x - 15}{x^2 - 4x - 5}$

in the simplest form showing the domain of n

[b] If the domain of the function n : $n(x) = \frac{x \quad 1}{x^2 - ax + 9}$ is $\mathbb{R} - \{3\}$

, then find the value of a

16 El-Menia Governorate

Answer the following questions : *(Calculator is allowed)*

1 Choose the correct answer from those given :

(1) $(-1)^{37} - (-1)^{36} =$ ....

(a) -2 (b) zero (c) 1 (d) 2

(2) The degree of the function $f : f(x) = 2x^3 + 3x^2 - 5$ is ....

(a) frouth. (b) fifth. (c) third. (d) zero.

(3) If $a + b = 7$, $a^2 \quad b^2 = 21$, then $a \quad b =$ ......

(a) 7 (b) 7 (c) -3 (d) 3

(4) The simplest form of the function $f : f(x) = \frac{3 \quad x}{x - 3}$ where $x \neq 3$ is ....

(a) 3 (b) 1 (c) -1 (d) zero

(5) The number of solutions of the two equations :

$x - \frac{1}{2} y = 4$, $2x - y = 1$ in $\mathbb{R}^2$ is ....

(a) one solution . (b) two solutions.

(c) an infinite number. (d) zero.

(6) If a die is tossed once , then the probability of appearance of a number greater than 4 is .....

(a) $\frac{2}{3}$ (b) $\frac{1}{6}$ (c) $\frac{1}{3}$ (d) $\frac{1}{2}$

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ the solution set of :**

$x + y = \text{zero}$, $5y^2 - 4x^2 = 36$

[b] Find n (X) in the simplest form and determine the domain of n :

$$n(X) = \frac{X-3}{X^2-7X+12} - \frac{4}{X^2-4X}$$

---

3 **[a] By using the general formula find in $\mathbb{R}$ the S.S. of :** $X^2 - X - 4 = 0$ where $\sqrt{17} \approx 4.12$

[b] If $n_1(X) = \frac{2X}{2X+4}$, $n_2(X) = \frac{X^2+2X}{X^2+4X+4}$ **Prove that :** $n_1 = n_2$

---

4 **[a] Find n (X) in the simplest form showing the domain of n :** $n(X) = \frac{X^2+2X+1}{2X-8} \times \frac{X\ \ 4}{X+1}$

[b] If (– 3 , 1) is a solution for the two equations $aX + by = 5$, $3aX + by - 17 = 0$

Find : a , b

---

5 **[a]** If the domain of n : $n(X) = \frac{\ell}{X} + \frac{9}{X+m}$ is $\mathbb{R} - \{0, -2\}$, n (4) = 1 **Find :** ℓ , m

[b] If S is the sample space of a random experiment where its outcomes are equal , A and B are two events from S , if the number of outcomes that leads to the occurrence of the event A = 13 and the number of all possible outcomes of the random experiment is 24 , $P(A \cup B) = \frac{5}{6}$ and $P(B) = \frac{5}{12}$

Find :

(1) The probability of occurrence of the event A

(2) The probability of occurrence of the events A and B together.

17 Assiut Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer :**

(1) The solution set of the two equations : $X = -1$, $y - 1 = 0$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(\ 1, 1)\}$ (b) $\{(1, -1)\}$ (c) $\{(-1, -1)\}$ (d) $\{(1, 1)\}$

(2) The solution set of the equation : $2X + 4 = 0$ in $\mathbb{N}$ is ....

(a) $\{2\}$ (b) $\{-2\}$ (c) $\{0\}$ (d) $\varnothing$

(3) The domain of the function f where $f(X) = \frac{X\ \ 2}{X^2+1}$ is ....

(a) $\mathbb{R}\ \ \{\ 1\}$ (b) $\mathbb{R} - \{1, -1\}$ (c) $\mathbb{R} - \{1\}$ (d) $\mathbb{R}$

(4) If $A \subset S$, $P(A) = \frac{1}{3}$, then $P(\grave{A}) =$ ....

(a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{1}{2}$ (d) $\frac{3}{2}$

(5) $|-5| =$ ....

(a) 5 (b) $-\frac{1}{5}$ (c) 5 (d) $\frac{1}{2}$

(6) If A and B are two mutually exclusive events of a random experiment , then P (A $\cap$ B) = ...

(a) $\varnothing$ (b) 1 (c) zero (d) $\frac{1}{2}$

2 **[a] Find algabrically the solution set of the two equations :**

$2x - y = 3$, $x + 2y = 4$

[b] Find n (x) in the simplest form showing the domain of n where :

$$n(x) = \frac{x^2+2x+4}{x^3-8} + \frac{x^2+x-2}{x^2-4}$$

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$x \quad y = 1$, $x^2 + y^2 = 25$

[b] If $n(x) = \frac{x^2-3x+2}{x^2-1} \div \frac{3x-15}{x^2-4x-5}$

, find n (x) in the simplest form showing the domain of n

4 **[a] Find in $\mathbb{R}$ the solution set of the equation :** $3x^2 - 5x - 1 = 0$
approximating the result to the nearest two decimals.

[b] If $n(x) = \frac{x^2+3x}{x^3+27}$, find $n^{-1}(x)$ in its simplest form showing the domain of n^{-1}

5 **[a]** If $n_1(x) = \frac{x^2}{x^3-x^2}$, $n_2(x) = \frac{x^3+x^2+x}{x^4-x}$ **Prove that :** $n_1 = n_2$

[b] A bag contains 15 identical balls numbered from 1 to 15 , one ball is chosen randomly , if the event A is getting an odd number and the event B is getting a number divisible by 5

Find :

(1) P (A) (2) P (B) (3) P (A – B)

18 Souhag Governorate

Answer the following questions : ***(Calculator is allowed)***

1 **Choose the correct answer :**

(1) The set of zeroes of the function f where $f(x) = \frac{x-3}{x+2}$ is ....

(a) {zero} (b) {3} (c) {– 2} (d) {3 , – 2}

(2) If $2^n = 3$, then 8^n = ...

(a) 27 (b) 9 (c) 3 (d) 6

(3) If A and B are two mutually exclusive events of a random experiment , then $P(A \cap B) = \cdots\cdots$

(a) $\varnothing$ (b) 1 (c) 2 (d) zero

(4) If $3^{x} + 3^{x} + 3^{x} = 9$, then $x = \cdots\cdots$

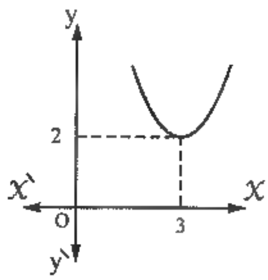
(a) 4 (b) 2 (c) 1 (d) 9

(5) If the two equations : $x + 3y = 6$, $2x + ky = 12$ have an infinit number of solutions , then $k = \cdots\cdots$

(a) 1 (b) 6 (c) 3 (d) 2

(6) **In the oppossite figure :**

The solution set of $f : f(x) = 0$ is $\cdots\cdots$



(a) $\varnothing$ (b) $\{3\}$

(c) $\{2 , 3\}$ (d) $\{2\}$

---

2 **[a] Solve in $\mathbb{R}$ the equation :** $2x^2 - 5x + 1 = 0$ approximating the result to the nearest two decimals.

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, **prove that :** $n_1 = n_2$

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3 **[a] Solve in $\mathbb{R} \times \mathbb{R}$ the two equations :** $x - 2y = 1$, $x^2 \quad xy = 0$

[b] Find n (x) in the simplest form showing the domain of n where : $n(x) = \frac{x}{x+1} + \frac{2x^2}{x^3 - x}$

---

4 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :**

$2x + y = 1$, $x + 2y = 5$

[b] If $n(x) = \frac{x^2 - 3x}{x^2 - 9} \div \frac{2x}{x+3}$, find $n(x)$ in its simplest form showing the domain of n

---

5 **[a]** If $n(x) = \frac{x \quad 2}{x+1}$,

Find : (1) $n^{-1}(x)$ showing the domain of n^{-1} (2) $n^{-1}(3)$

[b] If A and B are two events in a random experiment , $P(A) = 0.7$, $P(B) = 0.6$ and $P(A \cap B) = 0.4$

Find : (1) $P(A \cup B)$ (2) $P(A - B)$

19 Qena Governorate

Answer the following questions : *(Calculators are permitted)*

1 Choose the correct answer :

(1) If there are infinite numbers of solutions of the two equations

$x + 4y = 7$, $3x + ky = 21$, then $k =$ ....

(a) 4 (b) 7 (c) 12 (d) 21

(2) One of the solutions for the two equations : $x - y = 2$, $x^2 + y^2 = 20$ is ....

(a) $(-4, 2)$ (b) $(2, -4)$ (c) $(3, 1)$ (d) $(4, 2)$

(3) The set of zeroes of f where $f(x) = x^2 - 2$ is ....

(a) $\{2\}$ (b) $\{-2\}$ (c) $\{\sqrt{2}, -\sqrt{2}\}$ (d) $\varnothing$

(4) The simplest form of $f(x) = \frac{4x^2 - 2x}{2x}$, $x \neq 0$ is ....

(a) $4x^2$ (b) $2x - 1$ (c) $2x$ (d) 2

(5) If A and B are two mutually exclusive events, then $P(A \cap B) =$ ....

(a) $\varnothing$ (b) zero (c) 0.56 (d) 1

(6) If $A \subset B$, then $P(A \cup B) =$ ....

(a) zero (b) $P(A)$ (c) $P(B)$ (d) $P(A \cap B)$

2 [a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :

$2x - y = 3$, $x + 2y = 4$

[b] If $n_1(x) = \frac{2x}{2x + 4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$ **Prove that :** $n_1 = n_2$

3 [a] Find in $\mathbb{R}$ the solution set of the following equation by using the general rule :

$3x^2 = 5x - 1$ (Rounding the results to two decimal places)

[b] Find n (x) in the simplest form showing the domain of n where :

$$n(x) = \frac{x^2 + x + 1}{x} \times \frac{x^2 - x}{x^3 - 1}$$

4 [a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :

$x + y = 7$, $xy = 12$

[b] Find n (x) in the simplest form showing the domain of n where :

$$n(x) = \frac{3x - 4}{x^2 - 5x + 6} + \frac{2x + 6}{x^2 + x - 6}$$

5 **[a]** If $n(X) = \dfrac{X^2 - 2X}{(X-2)(X^2+2)}$

(1) Find $n^{-1}(X)$ and identify the domain.

(2) If $n^{\ 1}(X) = 3$ what is the value of X ?

[b] If A and B are two events from the sample space of a random experiment and

$P(A) = 0.7$, $P(A \cap B) = 0.3$ **Find :** $P(A - B)$

20 Luxor Governorate

Answer the following questions :

1 **Choose the correct answer :**

(1) The set of zeroes of the function $f : f(X) = X^2 + 3$ is ....

(a) $\{0\}$ (b) $\varnothing$ (c) $\{3\}$ (d) $\{3, -3\}$

(2) $\sqrt{16+9} = 4 + \ldots\ldots$

(a) 3 (b) 5 (c) 1 (d) 7

(3) If $\grave{A}$ is the complement event of the event A in a sample space of a random experiment , then $P(A) + P(\grave{A}) = \ldots\ldots$

(a) 2 (b) 1 (c) $\frac{1}{2}$ (d) 3

(4) If $3^X = 1$, then $X = \ldots\ldots$

(a) 0 (b) $\frac{1}{3}$ (c) 1 (d) 3

(5) The point of intersection of the two straight lines : $y = 2$, $X + y = 6$ is ....

(a) (2 , 4) (b) (2 , 6) (c) (6 , 2) (d) (4 , 2)

(6) If $(5, X - 4) = (y + 2, 3)$, then $X + y = \ldots\ldots$

(a) 6 (b) 8 (c) 10 (d) 12

---

2 **[a] Find the solution set of the two equations in $\mathbb{R}^2$:** $X - 2y = 0$, $X^2 \quad y^2 = 3$

[b] If $n(X) = \dfrac{X^2 - 16}{X + 4}$

Find : (1) $n^{\ 1}(X)$ showing the domain of $n^{\ 1}$ (2) $n^{-1}(4)$ (3) $n(4)$

---

3 **[a]** If $n_1(X) = \dfrac{2X}{2X+4}$, $n_2(X) = \dfrac{X^2 + 2X}{X^2 + 4X + 4}$ **Prove that :** $n_1 = n_2$

[b] Using the general rule find in $\mathbb{R}$ the S.S. of the equation :

$3X^2 = 5X - 1$ $\left(\text{given that } \sqrt{13} \approx 3.61\right)$

4 [a] If A , B are two events of the sample space of a random experiment and if

$P(B) = \frac{1}{12}$, $P(A \cup B) = \frac{1}{3}$

Find P (A) in the following cases :

(1) A and B are two mutually exclusive events (2) $B \subset A$

[b] If $n(X) = \frac{X^2 + X}{X^2 - 1} - \frac{5 - X}{X^2 - 6X + 5}$

Find n (X) in the simplest form showing the domain of n.

---

5 [a] If $n(X) = \frac{X^3 - 1}{X^2 \quad 2X + 1} \times \frac{2X - 2}{X^2 + X + 1}$

Find n (X) in the simplest form showing the domain

[b] **Find graphically in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations :**

$y = X + 4$, $X + y = 4$

21 Aswan Governorate

Answer the following questions : ***(Calculators are permitted)***

1 **Choose the correct answer from those given :**

(1) If $X + y = 5$, then $3X + 3y = \dots\dots$

(a) 5 (b) 3 (c) 8 (d) 15

(2) If $\sqrt{64 + 36} = 8 + X$, then $X = \dots\dots$

(a) 9 (b) 6 (c) 2 (d) 10

(3) The solution set of the two equations : $y - 5 = 0$, $y + X = 0$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(-5 , 5)\}$ (b) $(5 , -5)$ (c) $\{(0 , 5)\}$ (d) $(-5 , 5)$

(4) The set of zeroes of the function $f : f(X) = 4$ is ....

(a) $\{-4\}$ (b) $\{\text{zero}\}$ (c) $\varnothing$ (d) $\{2\}$

(5) If the probability that a student succeeded is 95 % , then the probability that he does not succeed is ....

(a) 20 % (b) 5 % (c) 10 % (d) zero

(6) The solution set of the equation : $X^2 - 4X + 4 = 0$ in $\mathbb{R}$ is ....

(a) $\{\ \ 2\}$ (b) $\{2\}$ (c) $\{4 , 1\}$ (d) $\varnothing$

---

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of two equations :**

$X + y = 4$, $2X - y = 2$

[b] If $n(X) = \frac{X - 1}{X + 3}$ find $n^{-1}(X)$ and identify the domain of n^{-1}

3 [a] If $n(X) = \frac{X^2 - 3X}{X^2 - 9} \div \frac{2X}{X + 3}$ **, find n (X) in the simplest form showing the domain of n**

[b] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :

$X - 2y = 0$, $X^2 - y^2 = 3$

---

4 [a] If A and B are two events from a sample space of a random experiment and

$P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$

Find P (A ⋃ B) if :

(1) $P(A \cap B) = \frac{1}{8}$

(2) A and B are mutually exclusive events.

[b] If $n(X) = \frac{X}{X^2 + 2X} + \frac{X - 2}{X^2 - 4}$ **, find n (X) in the simplest form showing the domain of n**

---

5 **[a] By using the formula find in $\mathbb{R}$ the solution set of the equation**

$3X^2 - 5X + 1 = 0$ rounding the result to two decimal places.

[b] Find the common domain in which the two functions n_1 and n_2 are equal where :

$n_1(X) = \frac{X^2 + X - 12}{X^2 + 5X + 4}$, $n_2(X) = \frac{X^2 - 2X - 3}{X^2 + 2X + 1}$

22 South Sinai Governorate

Answer the following questions : (Calculator is permitted)

1 **Choose the correct answer from those given :**

(1) The number of solutions of the two equations : $X + y = 5$ and $y - 5 = 0$ is ....

(a) zero (b) 1 (c) 2 (d) 3

(2) The point (– 3 , 4) lies in .... quadrant.

(a) fourth (b) third (c) second (d) first

(3) The range of the set of the values : 7 , 3 , 6 , 9 and 5 equals ....

(a) 3 (b) 4 (c) 5 (d) 6

(4) $(3X) \times (-5y) =$ ....

(a) $15Xy$ (b) $8Xy$ (c) $-8Xy$ (d) $-15Xy$

(5) If the fraction $\frac{X - a}{X + 3}$ is the multiplicative inverse of $\frac{X + 3}{X + 5}$, then a = ...

(a) - 5 (b) – 3 (c) 3 (d) 5

(6) If A and B are two mutually exclusive events, then P $(A \cap B)$ equals ....

(a) $\varnothing$ (b) zero (c) $\frac{1}{2}$ (d) 1

---

2 Find n (X) in the simplest form showing the domain of n where :

(1) $n(X) = \frac{X^2 + X}{X^2 - 1} - \frac{X - 5}{X^2 - 6X + 5}$ (2) $n(X) = \frac{X^2 + 2X}{X^3 - 27} \times \frac{X^2 + 3X + 9}{X + 2}$

---

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations graphically :

$y = X + 4$, $y + X = 4$

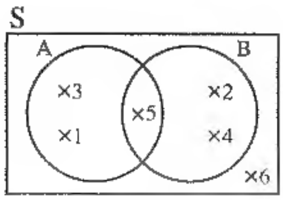
[b] By using the formula find in $\mathbb{R}$ the solution set of the equation : $2X^2 - 5X - 1 = 0$ approximating the result to the nearest one decimal.

---

4 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

$X - y = 1$, $X^2 - Xy = 0$

[b] Use the opposite Venn diagram and find :



(1) P $(A \cap B)$

(2) P $(A \cup B)$

(3) P $(A - B)$

---

5 [a] If the domain of the function n where $n(X) = \frac{b}{X} + \frac{9}{X + a}$ is $\mathbb{R} - \{0, 3\}$, n (6) = 7 find the values of a , b

[b] If $n_1(X) = \frac{1}{X + 1}$, $n_2(X) = \frac{X^2 - X + 1}{X^3 + 1}$ **, then prove that :** $n_1 = n_2$

23 North Sinai Governorate

Answer the following questions : ***(Calculators are permitted)***

1 Choose the correct answer from those given :

(1) The multiplicative inverse of $\frac{\sqrt{2}}{3}$ is ....

(a) $\frac{-\sqrt{2}}{3}$ (b) $\frac{3\sqrt{2}}{2}$ (c) $\frac{2\sqrt{3}}{3}$ (d) $\frac{\sqrt{3}}{2}$

(2) The S.S. of the two equations : $X - 2y = 1$, $3X + y = 10$ in $\mathbb{R} \times \mathbb{R}$ is ....

(a) $\{(5, 2)\}$ (b) $\{(2, 4)\}$ (c) $\{(1, 3)\}$ (d) $\{(3, 1)\}$

(3) Twice its square the number $\frac{1}{2}$ is ....

(a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) 1

(4) The domain of the function $f : f(X) = \frac{X-2}{7}$ is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{7\}$ (d) $\mathbb{R} - \{2, 7\}$

(5) $X^2 + kX + 9$ is a perfect square if k = ...

(a) 3 (b) -3 (c) ± 3 (d) ± 6

(6) If the probability of failure of a student is 0.4 , then the probability of his success is ....

(a) zero (b) 1 (c) $\frac{2}{5}$ (d) $\frac{3}{5}$

---

2 **[a] Using the general formula , find in $\mathbb{R}$ the solution set of the equation :**

$X^2 - 2X - 6 = 0$

[b] Find n (X) in the simplest form showing the domain of n where :

$$n(X) = \frac{X}{X-4} - \frac{X+4}{X^2-16}$$

---

3 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the following two equations :**

$X - y = 2$, $X^2 - 5y = 4$

[b] If $n(X) = \frac{X^2 + 3X}{X^2 + X - 6}$

(1) **Find :** $n^{-1}(X)$ and find the domain of n^{-1} (2) If $n^{-1}(X) = 2$, find value of X

---

4 **[a] Find in $\mathbb{R} \times \mathbb{R}$ the S.S of the following two equations graphically :**

$y = 2X - 3$, $X + 2y = 4$

[b] Find n (X) in the simplest form showing the domain of n where :

$$n(X) = \frac{X^3 - 8}{X^2 - 6X + 5} \div \frac{X^3 + 2X^2 + 4X}{2X^2 + X - 3}$$

---

5 [a] A bag contains 15 balls numbered from 1 to 15 , if a ball is drawn randomly , if the event A is getting an odd number and the event B is getting a prime number

Find : (1) P (A) (2) P (B) (3) P (A – B)

[b] If $n_1(X) = \frac{2X}{2X+4}$, $n_2(X) = \frac{X^2 + 2X}{X^2 + 4X + 4}$

Prove that : $n_1 = n_2$

24 Matrouh Governorate

Answer the following questions : (Calculator is permitted)

1 Choose the correct answer from those given :

(1) $3^{-2} =$ ....

(a) -9 (b) $\frac{-1}{9}$ (c) $\frac{1}{9}$ (d) 9

(2) If A and B are two mutually exclusive events in a random experiment , then $P(A \cap B) =$ ....

(a) zero (b) $\varnothing$ (c) 1 (d) $\{0 , 1\}$

(3) The solution set of the inequality : $X \leq 1$ in $\mathbb{N}$ is ....

(a) $\{1\}$ (b) $\{0\}$ (c) $\{0 , 1\}$ (d) $\{0 , 1 , -1 , ...\}$

(4) The set of zeroes of f where $f(X) = \frac{X^2 - 9}{X - 2}$ is ....

(a) $\{2\}$ (b) $\mathbb{R} - \{2\}$ (c) $\{3 , -3\}$ (d) $\{3 , -3 , 2\}$

(5) If $n(X) = \frac{X - 7}{X + 3}$, then the domain of n^{-1} is ....

(a) $\mathbb{R}$ (b) $\mathbb{R} - \{-3\}$ (c) $\mathbb{R} - \{-3 , 7\}$ (d) $\mathbb{R} - \{7\}$

(6) The point of intersection of the two straight lines : $y = 2$ and $X + y = 6$ is ....

(a) (2 , 6) (b) (2 , 4) (c) (4 , 2) (d) (6 , 2)

---

2 [a] Find the common domain in which the two functions f_1 and f_2 are equal where :

$$f_1(X) = \frac{X^2 + 3X + 2}{X^2 - 4} \quad , \quad f_2(X) = \frac{X^2 - 1}{X^2 - 3X + 2}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set to the following two equations graphically :

$y = X + 4 \quad , \quad X + y = 4$

---

3 [a] Find $f(X)$ in the simplest form , showing the domain of f where :

$$f(X) = \frac{X^2 - X}{X^2 - 1} + \frac{X + 5}{X^2 + 6X + 5}$$

[b] Find in $\mathbb{R}$ the solution set of the equation : $X^2 - 2X - 6 = 0$

approximating the result to the nearest two decimals.

4 **[a] Find n (X) in the simplest form showing the domain of n where :**

$$n(X) = \frac{X^2 - 3X + 2}{X^2 - 1} \div \frac{3X - 5}{X^2 - 4X - 5}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$y = X - 3$, $X^2 + y^2 = 17$

---

5 **[a] If the set of zeros of the function f where :**

$f(X) = a X^2 + b X + 8$ is $\{2, 4\}$ **Find the value of a and b**

[b] If A and B are two events in a random experiment

, P (A) = 0.8 , P (B) = 0.7 and P (A $\cap$ B) = 0.6

Find : (1) The probability of non occurrence of the event A

(2) The probability of occurrence of at least one of the events.